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THE

# SURVEYORS' INSTITUTION

(*Incorporated by Royal Charter*),

12, GREAT GEORGE STREET, WESTMINSTER, S.W.

# TRANSACTIONS.

VOL. XXXVIII.

SESSION 1905-1906.

LONDON:

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## ERRATA.

Page 416, Table 4, the headings of columns indicating varying exposures should be in the following order:—

| 2 hours' Exposure. | 6 hours' Exposure. | 12 hours' Exposure. | 18 hours' Exposure. |
|---|---|---|---|

Page 422, Table 10B, second line of heading should read:

"*Canvas hose* $2\frac{3}{4}$ *inches diameter.*"

Page 425, Table 13, B, second line should read:

"Adularia ·0000179."

# The Surveyors' Institution

INCORPORATED BY ROYAL CHARTER),

12, GREAT GEORGE STREET,

*WESTMINSTER, S.W.*

## OFFICERS, 1905-1906.

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1903 ALFRED BUCK
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*(The names of those deceased are printed in italics.)*

#### Honorary Secretary.

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#### Secretary.

ALEXANDER GODDARD.

# The Surveyors' Institution

(INCORPORATED BY ROYAL CHARTER)

**Is established—**

1. **To secure the advancement and facilitate the acquisition of that knowledge which constitutes the profession of a Surveyor, viz.—the art of determining the value of all descriptions of landed and house property, and of the various interests therein; the practice of managing and developing estates; and the science of admeasuring and delineating the physical features of the earth, and of measuring and estimating artificers' work.**
2. **To promote the general interests of the profession, and to maintain and extend its usefulness for the public advantage.**

THE INSTITUTION was established in 1868, was incorporated by Royal Charter in 1881, and has a total membership of between 3,000 and 4,000.

THE INSTITUTION consists of four classes, viz.—FELLOWS, PROFESSIONAL ASSOCIATES, ASSOCIATES, and HONORARY MEMBERS, with a class of STUDENTS attached.

A FELLOW must be more than twenty-five years of age, and must have acquired a responsible position and practical knowledge of surveying in one or other of its branches as above defined; and must have passed the Final Examination declared in the Rules of Examination to appertain to the class of Fellows, or some other Examination in the United Kingdom or the Colonies which the Council may declare to be equivalent thereto.* A Fellow has the right, conferred by the Charter, to use the letters F.S.I. after his name. A Fellow has also the right, under By-Laws allowed by H.M. Privy Council, to describe himself as "Chartered Surveyor."

A PROFESSIONAL ASSOCIATE must be more than twenty-one years of age, a Surveyor by profession, in practice on his own account or employed as an Assistant in a Surveyor's Office, and qualified for the class by having passed the Intermediate Examinations. A Professional Associate has the right, conferred by the Charter, to use the letters P.A.S.I. after his name. A Professional Associate has also the right,

* *The Council possess only a very limited dispensing power as regards the Examinations.*

under By-Laws allowed by H.M. Privy Council to describe himself as "Professional Associate Chartered Surveyor."

An ASSOCIATE must be more than twenty-one years of age, not a Surveyor by profession, but his pursuits must be such as to qualify him to concur with Surveyors in the advancement of professional knowledge.

An HONORARY MEMBER must be a person who, either by reason of his position or experience, or his eminence in science, may be enabled to render assistance in promoting the objects of The Institution, but who is not engaged in practice as a Surveyor in Great Britain or Ireland. He has the privilege of being present and taking part at all Ordinary General Meetings, and of access to the Library, but no right of voting, discussing, or otherwise interfering in the affairs of The Institution; nor is he called on to contribute to its funds.

STUDENTS (who must not be under eighteen years of age) qualify as such by passing the Preliminary Examination. Candidates for Studentship who can produce a Certificate of having passed the Matriculation Examination of the University of Oxford, Cambridge, London, or any other University in the United Kingdom, or who have passed, with Honours, the Senior Local Examination of the University of Oxford or Cambridge, or who have obtained a Higher Certificate at the Examinations of the Oxford and Cambridge Schools' Examinations Board, or who have passed the Examination qualifying for the Studentship of the Institution of Civil Engineers, or the Preliminary Examination of the Institute of Chartered Accountants, the Royal Institute of British Architects, or the Incorporoted Law Society, are exempted from this Examination, and may be admitted by the Council on the recommendation (according to a form) of four Fellows and two Associates, or of the Fellow or Associate to whom they are or have been articled; but it is obligatory on all Students to undergo the Intermediate Examination at the close of their Student course, at the time and under the conditions applying in each particular case under the Rules of Examination.

The Council may accord to Students such privileges, subject to such terms, regulations and restrictions, as they shall from time to time prescribe.

Any person desirous of being admitted into The Institution (excepting to the class of Students) must be proposed and recommended according to a form, in which the full

name, place of business (if any), usual residence, and qualifications of the candidate must be distinctly specified. This form must be subscribed by him, and signed by at least six Fellows or four Fellows and two Associates, certifying a personal knowledge of the candidate; or by four Members of the Council, of whom the President shall be one, after careful enquiry into the antecedents of the applicant.

The proposal so made, being delivered to the Secretary, will be submitted to the Council, who, on approving the qualifications, will determine the class for which the candidate is to be presented for ballot.

The following are the rates of contribution to the funds:—

| | Annual Subscription. £ s. d. | Admission Fee. £ s. d. |
|---|---|---|
| *Student* . . . | 1 1 0 | — |
| *Associate* . . . | 2 2 0 | 3 3 0 |
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| *Fellow* . . . | 3 3 0 | 5 5 0 |

No person can become a Member (other than an Honorary Member) of The Institution, unless and until he pays as his first Subscription to The Institution, in the case of becoming a Fellow of The Institution, the sum of Eight Guineas, in the case of becoming a Professional Associate of The Institution, the sum of Five Guineas, and in the case of becoming an Associate of The Institution, the sum of Five Guineas.

All Fellows, Professional Associates, and Associates, are required, within twelve months after their election, to deliver to the Council an original Paper on some subject connected with the profession, or to make a donation to the Library or Collection.

The affairs of The Institution are under the management of a Council, which is elected annually, consisting of a President, four Vice-Presidents, sixteen Fellows, two Professional Associates, and two Associates.

The Session of The Institution commences annually on the second Monday in November, and continues to the end of May. The Ordinary General Meetings are held on every alternate Monday during the Session. At these Meetings original communications are read on professional subjects, and their merits fully and freely discussed. Every Member has the privilege of introducing one visitor to these Meetings. Members are entitled to a copy of any printed publication issued by The Institution after their admission.

PAPER 313.
No. 488.

# THE OPENING ADDRESS

BY

CHARLES BIDWELL, M.A. (PRESIDENT),

AT THE ORDINARY GENERAL MEETING OF

## THE SURVEYORS' INSTITUTION,

NOVEMBER 13TH, 1905.

---

GENTLEMEN,

In addressing you for the first time from the Chair, to which, by your kindness, I have been elected, I beg you to believe that I am deeply sensible of the honour which you have conferred upon me, and that I also feel the great responsibility I am undertaking in endeavouring to discharge to your satisfaction the duties of the President of this great Institution.

When I call to mind the men, eminent in their profession, who have preceded me in this important position, I entertain some serious doubts of my ability to cope with the various duties of the office; but of this you may rest assured, gentlemen, that my best endeavours will be given to uphold and maintain the welfare of The Institution. I can only ask you, in all sincerity, to forgive my manifold shortcomings.

As probably most of you are aware, I was, as it were, born into the profession of a land agent and surveyor. My father, who died in 1874, was one of the Founder

Members of The Institution, and I have had the honour of being a Fellow since March, 1869.

My work and practice have been chiefly confined to the country, and necessarily the few thoughts and experiences which this address contains are mainly concerned with country topics.

I would like first to touch briefly upon some of the changes which have taken place in connection with landed property since the sixties.

The fall in the value of land, other than urban, is patent to the nation at large, and to land agents in particular, from their every-day experience. Nor, unfortunately, can it be limited to the depreciation in annual value disclosed by the Inland Revenue Reports and by the rent-books of every rural estate in Great Britain. The capital value of country property has suffered to an even greater extent than its annual value, for whereas, in the early seventies of the last century, buyers of land were satisfied with a 3 per cent. return from their investments in what was then looked upon as the best of all securities, this class of property has now lost its attraction to many investors, with the consequence that, at present, prices range rather in the neighbourhood of 20 than of 30 years' purchase. This statement is corroborated by the fact that so great an authority as Sir Robert Giffen estimated that, in 1875, the capital value of agricultural land in Great Britain was equivalent to 30 years' purchase on the gross annual value assessed to Schedule A of the income tax, while twenty years later, Sir Alfred (now Lord) Milner, when giving evidence in 1894 before the Royal Commission on Agricultural Depression, as head of the Inland Revenue Department, expressed the opinion that 18 years' purchase of the

same assessment would suffice to express the capital value.

Taking the calculations of these two eminent authorities, we obtain the following striking table:

GREAT BRITAIN

| | Annual Value of Lands, Sch. A. Income Tax. | Years Purchase. | Capital Value. |
|---|---|---|---|
| | £ | | £ |
| 1875 | 55,618,428 | 30 | 1,668,552,840 |
| 1894 | 46,317,729 | 18 | 833,719,122 |
| 1904 | 42,775,711 | 18 | 769,962,798 |

These figures show a decrease of 50 per cent. in value in land from 1875 to 1894, and 54 per cent. from 1875 to 1904.

I confess I cannot at the present time take quite so pessimistic a view. Having regard to the depression which has recently occurred in all kinds of securities, land has somewhat recovered its position as a safe security in the opinion of the public. Many investors are content with a 4 per cent. return from sound landed properties, but I should be disposed to take the average value on the $4\frac{1}{2}$ per cent. table ($22\frac{1}{2}$ years' purchase), and only in very exceptional cases should I accept the 5 per cent. table (20 years' purchase), as the multiplier.

Even, however, taking this less gloomy view, the fact remains that in thirty years, after making every allowance for the absorption of land in the neighbourhood of large towns for building purposes, the depreciation in the capital value of lands assessed to Schedule A of the income tax has approximated very closely to the total of our national indebtedness. What that means to the

large class of owners, whose estates are burdened with settlements or mortgages imposed in better times, it needs no words of mine to describe.

Taking the Inland Revenue Annual Reports, and comparing the year 1893-4 with the latest available (1903-4), there has been a net decrease in the gross amount of income arising out of the ownership of land of £3,719,481, or nearly 7 per cent. in 10 years, the principal decreases being:—

| County. | Gross Annual Value, 1893-4. | Gross Annual Value, 1903-4. | Decrease. | |
|---|---|---|---|---|
| | | | Actual. | Per Cent. |
| | £ | £ | £ | |
| Norfolk - - | 1,470,508 | 1,228,553 | 241,955 | 16·5 |
| Kent (outside Metropolis)- | 1,399,027 | 1,179,613 | 219,414 | 15·5 |
| Suffolk - - | 927,945 | 743,772 | 184,173 | 20 |
| Essex - - | 1,066,183 | 888,707 | 177,476 | 16·5 |

Farmers' profits (Schedule B) during the same period show a decrease in England of £1,098,220, or 8·2 per cent., and in Scotland of £139,708, or 6·7 per cent.

There are, no doubt, many minor causes which help to account for this great decrease in the value of landed estate, but the chief factor is, undoubtedly, the reduced value of all agricultural produce.

It may be a bold statement to commit oneself to, but I am of opinion that we have touched bottom, and that landowners and farmers, having been through the fire of adversity, are rapidly adapting themselves to the changed condition of affairs.

Landowners have learned by sad experience the change of circumstances with regard to purely agricul-

tural estates. The old-fashioned lease, drawn by the lawyer land agent, with its restrictive clauses, by which a tenant was bound down so tightly that he could by no possibility regulate his system of farming to meet the altered condition of things, is almost a relic of the past.

The generality of tenants in these days prefer a yearly agreement with fairly liberal covenants, giving them power to use their abilities to make the most of their holding, and, at the same time, containing clauses to prevent the farm being run out and exhausted.

In the large area of the Fens, than which no better land, from an agricultural point of view, exists, the growing of potatoes, white and brown mustard, and celery, cauliflowers, cabbages, and onions for the London markets largely obtains and is very remunerative. Some twenty-five years ago this line of industry was not dreamed of, and the fact that it is now so largely followed, and that similar activity in other directions has been shown elsewhere, leads me to think that the agriculturist is not quite so lacking in enterprise as has sometimes been declared, and that, recognising the need for new methods and greater effort, he will find the means of obtaining a fair return for the money and labour invested in his business.

The practical effect of the Tithe Act, 1891, making the owner of the land responsible for the tithe instead of the occupier, and changing the mode of recovery from distraint to a summons in the County Court, has, in my experience, been quite satisfactory. At first it was somewhat difficult to make owners understand their responsibility, but now the system works fairly smoothly, and the friction, which was formerly engendered between the clergy and their parishioners by the demand for this due, has been allayed.

It is worthy of comment that, after a continuous fall in the value of £100 tithe rent-charge from £112 7*s.* 5¼*d.* in 1877 to £66 10*s.* 9¼*d.* in 1900, there has since been a slight upward tendency, viz:—

| | £ | s. | d. |
|---|---|---|---|
| 1901 | 67 | 3 | 8¾ |
| 1902 | 69 | 7 | 5 |
| 1903 | 69 | 19 | 6 |
| 1904 | 69 | 12 | 0¼ |

The average for the year 1904 is below that for 1903 in consequence of the "Leiter" year, when the wheat trade was abnormally raised by speculation, having dropped out of the septennial average.

Surely this upward movement in tithe may be taken as a first indication that agricultural depression has touched bottom, if it may not be said to be already decreasing.

The Agricultural Holdings (England) Acts, 1883 and 1900, have, in my opinion, worked beneficially in the interests of both the owner and the occupier, and I venture to think that they are sufficiently comprehensive if properly administered. Two weak points in their administration have frequently been brought to my notice, viz.:—

1. The want of uniformity and system in the allowance made for unexhausted improvements in the several counties, and even in different districts in the same counties.

I venture to suggest that an authoritative and uniform scale of allowances (based on Lawes' Tables) for the unexhausted value of cake, feeding stuffs, and artificial manures might be issued by the Board of Agriculture and Fisheries and made the accepted basis of compensation. The adoption of this suggestion would, in my opinion, tend to prevent litigation.

2. The too frequent absence, in Tenant Right Valuations, of due consideration in respect of claims for dilapidations and deterioration of the holdings. In other words, it is by no means uncommon that the bad tenant is too highly compensated in his outgoing valuation, while the good tenant receives too little.

The allowance for manurial returns on feeding stuffs and artificial manures is the same to the bad tenant who leaves his arable land in a foul condition and his pastures neglected as to the good tenant, though the returns from the manures under these conditions cannot be the same: and further, there is the heavy outlay to the incoming tenant of cleaning the land, an item of expenditure which is too frequently ignored or lightly treated as against the outgoing tenant.

I would further suggest that one or two leading representative surveyors in each county (selected by the Board of Agriculture and Fisheries) should be appointed as official sole arbitrators to adjudicate upon disputed questions of dilapidations or changes of tenancy. I am aware that under Schedule II. of the Act of 1900 the Board have power to nominate an arbitrator or umpire to act in certain cases, but I believe it would much facilitate the settlement of disputed claims if it were known who were the official arbitrators in their respective counties.

From the statistics I have already given, it will be observed that the counties of Norfolk and Suffolk, containing together some 2,263,380 acres, have experienced about 18 per cent. decrease in the amount of income derivable from landed estate. This may be largely accounted for by the fact that there are, in these counties, large tracts of heath and open light lands which, with cereals at their present price, will not pay to farm, and

which have therefore gone out of cultivation for ordinary farm crops.

By a fortunate dispensation, however, they have proved specially suited to the production of another form of crop which, in these poor districts, will be found to give a better return. I refer of course to the game crop, particularly partridges, which may rightly be looked upon as the one hope of many a harassed landowner in East Anglia. For, on many of the large estates in Norfolk and Suffolk, one of the chief sources of income at the present time is the letting of the sporting rights. These often fetch a high figure where the furnished mansion and the shooting are let together for the season, and it is within the limit to say that these shootings will realise from 3*s.* to 5*s.* per acre. Indeed it would not be an overstatement to say that, as to one-fourth part of the county of Norfolk, the chief source of income is the letting of the sporting rights.

Distance from a railway station was formerly an important element in letting shooting estates, but with the advent of the motor car this is not now so material, while the great demand for shootings, and the system which has recently grown up, by which many of the large shoots are taken by syndicates, have also tended to make the possibilities of an estate in this direction a factor which no land agent could properly overlook.

Another very serious question, affecting materially the value of landed estates, is the increase in the burden of imperial and local taxation upon all kinds of property.

Dealing first with imperial taxation, it is worthy of comment that, three years after the termination of the war, the Chancellor of the Exchequer calls upon us to disburse the abnormally high proportion of 5 per cent. of our income for Imperial purposes, in the form of Income

Tax. Whether such a demand can be looked upon as consistent with sound finance, leaving a sufficient reserve to be called upon in time of stress, it is not for me to say, but at least this tax has the merit of being imposed upon incomes generally, and does not weigh more heavily upon land than upon other forms of property.

Similar testimony cannot be given in respect of that form of taxation known as the Death Duties, imposed under the Finance Act of 1894, of which we have now nearly ten years' experience.

It is somewhat difficult to draw a comparison between the state of things which prevailed before the Finance Act was passed and that which now obtains, but it is evident that the proportion payable by realty is considerably higher than it was before Sir William Harcourt's Bill became law.

For instance, in 1893-4 (before the Finance Act) the Death Duties, including Probate, Inventory and Account Duty, Estate Duty, Legacy Duty, and Succession Duty approximated £9,500,000 for Great Britain. Of this sum realty's share was £1,000,000, or about one-ninth of the whole, whereas in 1903-4, under the Finance Act, realty in Great Britain paid Estate Duty (including Settlement Estate Duty) amounting to £2, 972,446, which equals nearly one-fourth of the total received, or double the proportion paid in 1893.

I think we may admit that, on the whole, the Finance Act has been a successful measure from the financier's point of view, but many of us are doubtless aware of cases in our experience in which the Death Duties have had a very crippling effect upon estates, and where it has taken a considerable period for the new owner to recover from their payment.

But it is rather to the extraordinary increase in local

burdens that I would direct your attention, for, since the Poor Law Exemption Act in 1840, now annually renewed by the Expiring Laws Continuance Act, exempted personalty from liability to the payment of rates, this falls wholly upon realty.

The present system of valuation and assessment under the Rating Act of 1874 (37 and 38 Vict., cap. 54) is most unequal and unsatisfactory, and I trust the time is not far distant when a well-thought-out government measure, on the lines of the majority report of the Royal Commission on Local Taxation, will be introduced, dealing with the whole question of the assessing of real estate for both Imperial and Local Taxation.

The rates and taxes on landed properties have gone up by leaps and bounds in the last 20 years. We have now, in addition to the Poor Rates, the County Council Rates (embracing roads, bridges, lunacy, &c.,), Education Rates, and other local burdens such as water supply, sanitation, &c.

Sir John Hibbert, in an address to the County Councils' Association in May last, gave the following figures showing the increased cost of the maintenance of main roads.

COST OF MAIN ROADS.

| | 1894. | 1904. |
|---|---|---|
| | £ | £ |
| Bedfordshire - - - | 20,000 | 34,000 |
| Essex - - - - - | 47,000 | 93,000 |
| Glamorganshire - - - | 18,000 | 38,000 |
| Gloucestershire - - - | 62,000 | 66,000 |
| Hampshire - - - - | 11,000 | 61,000 |
| Lancashire - - - - | 136,000 | 147,000 |
| Norfolk - - - - | 43,000 | 54,000 |
| East Suffolk - - - - | 9,000 | 14,000 |
| Worcestershire - - - | 23,000 | 56,000 |
| West Riding, Yorkshire - | 146,000 | 168,000 |

I think it will be admitted on all hands that the main roads of the country are vastly improved, and are now maintained with some degree of uniformity in the several counties, but whether those who pay the immensely increased cost of this improvement reap a proportionate benefit from it, is open to question.

I venture to suggest that a system should be initiated whereby the owners of motor cars and motor bicycles should be made to contribute some quota towards the cost of maintaining main roads and bridges. The country towns and villages suffer, not inconsiderably, from the dust and smell created by these machines, and the general public who use the highways are subject to considerable risk from the frequent reckless driving of motors.

These annoyances must, I apprehend, be borne patiently, but meanwhile it is somewhat unfair that motorists should have the use of the roads practically free of charge, particularly as the great increase in the cost of their upkeep is largely due to the demand which has arisen for a condition of surface, far superior in many cases to the needs of the district upon which the increased expenditure must fall.

In my view, motors might fairly be taxed by means of licences, to an extent which would provide the means of paying any cost of upkeep beyond that necessary for the normal traffic of the district; the sum thus obtained to be handed over to the local authorities, in the same manner as other government subventions.

The working of the Education Act has no doubt added materially to the expenditure of the country, but I cannot conceive that any deep-thinking or right-minded person can object to the principle of an Act which gives the opportunity of that most valuable and essential gift

—education—to every child of the kingdom. It is almost unnecessary to repeat the oft-stated truism that, if we are to hold our own with foreign countries, we must educate the rising generation of the nation.

Personally, I never grudge time or money for education, both elementary and higher, and as Chairman of the Education Committee of my own county—the Isle of Ely—I give a great deal of the former to the cause.

Sir John Hibbert, in the address before referred to, gives the following rates already required for elementary education under the new system:—

| | d. | |
|---|---|---|
| Surrey - - - - - - | 11½ | in the £. |
| Glamorgan - - - - - | 11 | „ „ |
| Cambridgeshire - - - - | 10½ | „ „ |
| Gloucester and Lancashire - - | 10 | „ „ |
| Buckinghamshire and Hampshire - | 9½ | „ „ |
| Six other counties - - - - | 9 | „ „ |
| Two „ „ - - - - | 8½ | „ „ |
| Five „ „ - - - - | 8 | „ „ |
| Two „ „ - - - - | 7½ | „ „ |
| Eleven „ „ - - - - | 6½ | „ „ |

I conscientiously believe that the education committees throughout the United Kingdom are doing good work for the future of the nation, and to my mind it is a valuable asset that so many more of the laity are taking an interest in the subject of education.

One point in this connection I should like to emphasise, namely that, in rural schools, useful technical knowledge should be taught, *e.g.*, to the boys, gardening, carpentering, blacksmith's work, and nature study; and to the girls, simple cookery, dairy, laundry, and house work. This practical instruction would be of great advantage in after life, and, by giving rise to a more intelligent interest in country pursuits, should tend to check that exodus from rural districts which we all deplore.

The 1904 Code of the Board of Education recognises these subjects, and now that those who pay the piper are entitled to call the tune, I would strongly advise my colleagues in the provinces to see that the syllabuses contained therein are brought to the notice of their school managers.

In many districts, too, it might be of advantage to draw attention to the little-known provisions of the Elementary Education (School Attendance) Act (1893), Amendment Act, 1899 (62 and 63 Vict., cap. 13), commonly known as Robson's Act, which, on certain conditions, allows local authorities to make by-laws, applicable to particular parishes or districts, whereby children over eleven and under thirteen years of age, who have passed the standard fixed for partial exemption from school attendance, need not be required to make more than two hundred and fifty school attendances in the course of the year.

In my own county we have made use of our powers under this measure by adopting the special by-law for children to be employed in agriculture.

The object of the Act was to enable children of a certain standard to be away from school during the time when labour is most needed on the farm, thereby assisting the farmer, and, at the same time, in the case of the child, laying the foundation of a knowledge and interest in agricultural matters which might not otherwise be acquired. Country members will, I think, agree that the rural labourer is less efficient than he was, particularly where care and skill are most needed, *e.g.* in hedge-cutting, thatching, draining, &c., and this I attribute largely to the difficulty of interesting lads in these arts after the age of thirteen or fourteen, in cases where, up to that time, they have received no instruction tending

to arouse their interest in matters of this nature. The position, however, is now changed, and, as far as the early education of the country lad is concerned, it rests with ourselves to see that it is such as will fit him for his future career.

The system of higher and secondary education, which has been recently instituted and is gradually getting a hold of the country, gives every facility, by means of scholarships and special technical education, for a clever boy or girl in an elementary school to rise in the world and mount the ladder of success.

And now that I am dealing with educational matters I would briefly refer to the great advantages which I trust will accrue to many of the young men joining our ranks from the scholarships which the Council have decided to offer to students at the Universities of Cambridge, Durham, and Wales.

As a member of Cambridge University, it is my pleasing duty to inform you that the Vice-Chancellor, on behalf of the University authorities, has desired me to say how pleased they were that the scholarships would bring the University in touch with this Institution.

The object that the Council have in view is to give a future surveyor the opportunity of studying at a university technical subjects which will be useful to him in following his profession. A year of his articles as a pupil may run concurrently with the last year of his university course, so that he will not be losing time in preparing for his future career, and surely the cultivation and development of the mind, which should be the result of three years well spent at the university, should enable the graduate to hold his own, if not to outstrip and pass his colleague whose time has been

given only to the acquisition of a purely technical knowledge of his profession.

To return to the question of the burdens upon real property, the following figures go to show the large and steady increase which has taken place in the expenditure of local authorities in England and Wales during the last thirty years :—

| | Average Amount of Rates raised per Head of Population. | | | Average Amount of Loans outstanding per Head of Population. | | |
|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | s. | d. |
| 1874-1875 | | 16 | 2 | 3 | 18 | 3 |
| 1879-1880 | | 17 | 6 | 5 | 7 | 11 |
| 1884-1885 | | 19 | 1 | 6 | 8 | 8 |
| 1889-1890 | | 19 | 6 | 6 | 19 | 8 |
| 1894-1895 | 1 | 2 | 6 | 7 | 16 | 4 |
| 1899-1900 | 1 | 5 | 7 | 9 | 4 | 4 |
| 1902-1903 | 1 | 10 | 6 | 11 | 4 | 8 |

Average Rates raised per £ of Valuation.

| | s. | d. | |
|---|---|---|---|
| 1874-1875 | 3 | 3·8 | per £ of Rateable Value. |
| 1879-1880 | 3 | 3·8 | |
| 1884-1885 | 3 | 6·3 | |
| 1889-1900 | 3 | 8·2 | |
| 1894-1895 | 4 | 2·4 | |
| 1899-1900 | 4 | 11·8 | per £ of Assessable Value, Agricultural Land assessed at one-half. |
| 1902-1903 | 5 | 7·4 | |

Total Amount of Rates raised.

| | £ |
|---|---|
| 1874-1875 | 19,198,579 |
| 1879-1880 | 22,160,099 |
| 1884-1885 | 25,666,552 |
| 1889-1890 | 27,713,409 |
| 1894-1895 | 33,855,283 |
| 1899-1900 | 40,734,219 |
| 1902-1903 | 50,328,412 |

These figures do not represent the total receipts, *e.g* in 1902-3 there were 12¾ millions obtained from local taxation duties and government grants; 30 millions obtained from market tolls, gas and water undertakings, &c.; and 35 millions borrowed for water works, tramways, and other municipal undertakings.

It is somewhat startling to find that the total rates, taking no account of the subventions, have risen nearly 200 per cent. in the past 30 years, and this brings home to us the importance of impressing our representatives on local councils with the necessity for the exercise of true economy in their expenditure.

A subject which at the present is causing considerable anxiety in the country, and upon which a great deal of discussion has taken place, is the depopulation of the rural districts and the influx of labourers and their families into the towns. This is a matter which seriously affects the future of the landed interest and the nation at large.

The rural population has, in the past, been the backbone of the country in maintaining physical development, and in producing sound healthy men to recruit our navy, army, and working classes, and this draining of the strong, able-bodied men from the country into the towns must have an injurious effect on the future population of the nation.

I am disposed to believe that we are passing through a transition period, and that in a few years the balance will be restored.

This desire to migrate to towns arises from several causes, the chief of which are the difficulty often met with of obtaining decent cottages and homes in the country villages, the first effects of the Education Act, the cheap facilities for travel, the educative influence of

the cheap newspaper, and the desire for more amusement and excitement than life in the country affords, the women being particularly sensitive on this latter point.

That there is at present a serious lack of employment in urban districts is patent to all, and this may be calculated to have its effect in checking the exodus from the country of the more thoughtful minded of the rural labourers.

In 1899 the Board of Trade Labour Returns showed an average of 2·4 per cent. unemployed for the year. In 1894 the percentage was 6·5 per cent.; the present year, starting with about 7·6 per cent., was reduced in the summer months to 5·25 per cent., but this want of employment is almost sure to be intensified as the winter approaches, unless the termination of the recent war gives a very pronounced impetus to trade.

At any rate the building trade, which perhaps most seriously affects the ranks of the unemployed, is, I understand, in a very depressed condition, largely owing to the most prosperous centres of population being overbuilt during the good times.

The distress of last winter, and the shortness of work since, led to the Unemployed Workman's Act being passed last session. As originally introduced, it contained the new and socialistic proposal that the unemployed had the right to look to the ratepayer for work. This principle of the Bill was amended, but even now the thin end of the wedge is introduced, I understand, by allowing local authorities to acquire, out of the rates, land for the formation of labour colonies.

The difficulty in dealing with the problem of the "unemployed," and the remedies to be adopted, is one the seriousness of which it is impossible to overestimate; and I rejoice to see that the matter has been

referred to a strong Royal Commission, whose inquiry will be pushed forward with all speed, and whose report will be awaited with anxiety.

If we are to retain the intelligent young labourer on the land, we must provide him with a decent cottage, a fair-sized plot of ground (say not less than 20 poles), and the fruit trees with which to plant it. But the impossibility of building decent cottages without an annual loss to the landowner is within the experience of every Member of this Institution. If the money be borrowed of any of the Improvement Companies, it cannot be obtained at less than $4\frac{7}{8}$ per cent. including repayment of principal spread over 40 years, and in addition there are the fees of the Board of Agriculture for passing and certifying the outlay.

The following table of one of the Improvement Companies I quote from an article in the *County Gentleman* of October 29, 1904.

Rates of instalment per cent. per annum to repay loans of £500 and upwards for cottages and other agricultural improvements :—

| | £ | s. | d. | |
|---|---|---|---|---|
| 20 years - | 7 | 3 | 0½ | These figures include sinking fund and interest, the interest being calculated at 3½ per cent. |
| 25 „ - | 6 | 3 | 11¾ | |
| 30 „ - | 5 | 11 | 7¼ | |
| 35 „ - | 5 | 3 | 1 | |
| 40 „ - | 4 | 16 | 11¼ | |

We have recently had the advantage of inspecting the Cheap Cottage Exhibition at the Garden City, Letchworth. The Exhibition has no doubt accomplished some important results. It has called the attention of the public to the better housing of the labourer; it has proved that for an outlay of £150, under certain conditions, a cottage suitable for a labourer and his family can be built by a landowner. It has shown that restrictive by-laws must seriously impede the building of rural homes; and it has given us examples of cottages

built with various patent materials, and has introduced to our notice numerous modern and patent fittings..

Many of the cottages are, however, in my opinion, quite unfitted for the homes of agricultural labourers, and I venture to suggest that the life of some of these cheap cottages will not bear comparison with a pair of good substantial cottages in brick and slate, or brick and tile, costing from £350 to £400 the pair, including out-buildings. At the same time I recognise that the exhibition has done great good, and that there is much to be learnt from it.

What the country needs, and what, in my judgment, would be better in the interests of the nation, is not so much a cheap class of cottage as cheap money with which to erect decent cottages.

The Small Holdings Departmental Committee, of which I have the honour to be a member, have had some very striking evidence before them on the matter of labourers' cottages, and this question will no doubt be dealt with in their report.

Ireland, as is so often the case under recent legislation, is in a better position than the rest of Great Britain with regard to the provision of public money for the erection of labourers' cottages, for Section 17 of the Labourers Act, 1883, empowers rural district councils to borrow money for the purposes of the Labourers Acts on the credit of the rates, and Section 18 of the same Act enables the Board of Works, Ireland, to issue, with the sanction of the Treasury, the required loans. The period for repayment of the loans issued by the Board of Works and the rates of interest charged are fixed by Treasury Minute and have varied at different times since the passing of the first Labourers Act (1883).

The rates of interest now in force, for loans issued since 1904, are :—

| | | | |
|---|---|---|---|
| For loans repayable in 20 years | - | - | 3½ per cent |
| „ „ „ 30 „ | - | - | 3¾ „ „ |
| „ „ „ 40 „ | - | - | 4 „ „ |
| „ „ „ 50 „ | - | - | 4¼ „ „ |

Rural District Councils prefer, as a rule, to borrow for the longest period allowed (50 years), and the loans are repaid to the Board of Works by equal annual payments, or annuities, consisting of repayment of a portion of the principal, and interest on the balance of the principal outstanding at the time.

The following is the number of cottages built or being built in Ireland with public money up to 31st March, 1905 :—

| Province. | Valuation. of Rural Districts. | No. of Labourers' Cottages. | | Amount of Loan. | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Built. | In course of construction. | Sanctioned. | | | Received. | | |
| | £ | | | £ | s. | d. | £ | s. | d. |
| Ulster - - | 3,409,022 | 1,247 | 423 | 331,401 | 17 | 1 | 240,270 | 10 | 0 |
| Munster - | 2,964,000 | 10,021 | 720 | 1,536,556 | 0 | 6 | 1,410,528 | 18 | 3 |
| Leinster - | 3,485,358 | 7,594 | 391 | 1,269,196 | 4 | 6 | 1,139,612 | 8 | 1 |
| Connaught | 1,373,911 | 299 | 108 | 56,918 | 0 | 3 | 50,447 | 2 | 10 |

Under the Irish Land Act 1903, imperial funds have been made available for the purchase of their holdings by private persons on still more favourable terms, so that the Irish occupier may now become owner of his farm on payment of 3¾ per cent of its capital value for 68 years.

Possibly such advantageous terms could not properly

be expected on the security of a more perishable form of property such as labourers' cottages, but in view of the immense importance to the nation that the country population should be suitably housed, and not forced to migrate to centres already overcrowded, I would strongly urge legislation empowering English and Scotch land-owners to borrow government money for the erection of cottages, on terms somewhat approximating those already granted to the Irish tenant under the 1903 Act.

A kindred question is that of rural by-laws which has recently been before the Institution and the general public. I do not propose to reopen the controversy, especially as the question has been dealt with under the Public Health Acts (Amendment) Bill of last session by a Select Committee of the House of Lords, whose report is published in the form of a short amended Bill of five clauses, the principal clause (2) of which is to exempt buildings sufficiently isolated from the operation of existing and future building by-laws.

I can only state, from my own experience, that the rural by-laws at present in force are, in many cases, too arbitrary, and quite impracticable for dealing with building in country districts. We want a simple code of rural by-laws which shall be fairly elastic and not oppressive, and I should prefer to see any disputes, which may arise under them in rural districts referred to the Board of Agriculture and Fisheries, rather than to the Local Government Board.

There is another subject which is of paramount importance to the country districts, that is, the water supply of small country towns and villages, which, in many places, has become an urgent question. In my judgment it is a matter of national importance, and one which must be dealt with without much delay, and I

trust the time is not far distant when we shall see, either a National Water Board in London, or the country divided up into large areas, each with a representative water board empowered to deal with all questions affecting the water supply of its own district, *e.g.* the storage of water, the pollution of the rivers and streams, and the abstraction of water from a particular district by large cities situate at a considerable distance from the source of supply. Our present system, or rather want of system, engenders waste, friction, and public loss and inconvenience.

I propose now to touch very briefly on the burning question of the food supply to these islands. The Report of the Royal Commission on our Food Supply in Time of War has recently been published, and I can strongly recommend this Report for your perusal. It contains some very startling facts.

Avoiding most carefully any political or controversial opinions, I would merely point out, as a fact, that this country, in the best of years, can only produce something less than one-fifth of the wheat required for its food supply.

I am in favour of encouraging by all legitimate means our own home supply, and further look upon it as essential that our Colonies shall be induced to do all that lies in their power to supplement our wants in this direction, so that—as far as may be—our Empire may be self-contained and self-supporting.

An enormous virgin area in North-west Canada suitable for wheat growing will in a few years be opened up, and this, one would hope, would render us independent of those violent changes in the sources of our supply which are noticeable in the following table:—

Imports of Wheat (Grain, and Flour in equivalent weight of Grain) into the United Kingdom, with principal places of export :—

| Years. | United States. | Argentina. | Russia. | India. | Australia. | Total Imports from all Countries. |
|---|---|---|---|---|---|---|
| | cwts. | cwts. | cwts | cwts. | cwts. | cwts. |
| 1900 | 57,418,064 | 18,769,000 | 4,506,523 | 6,239 | 2,919,267 | 98,597,450 |
| 1901 | 66,855,025 | 8,309,706 | 2,580,805 | 3,341,500 | 6,197,019 | 101,064,682 |
| 1902 | 64,961,474 | 4,543,236 | 6,620,104 | 8,842,182 | 4,217,013 | 107,927,701 |
| 1903 | 46,730,727 | 14,232,525 | 17,277,481 | 17,058,698 | 61 | 116,744,152 |
| 1904 | 18,513,548 | 21,841,650 | 23,708,306 | 25,521,097 | 11,364,669 | 118,230,961 |
| 1905 (six months). | 5,498,782 | *12,837,600 | *11,461.100 | *11,921,200 | *5,781,200 | 54,645,554 |

* Excluding flour, included in these instances with "Other Countries" in "Trade and Nav. A/c."

It will be seen from the above table that the wheat supply from the United States has fallen considerably in the last two years, and now takes about fifth place; Argentina, Russia, Australia, and India making up the deficit. These two last countries are rather uncertain sources of supply, as they are largely dependant upon their rainfall, while the present internal condition of Russia, and the lack of affinity between that nation and our own, would make it inadvisable to rely too greatly upon a supply derived from that country.

It seems possible that, in the future, we must look for much greater variations in the price of wheat than we have been accustomed to of late, and any suggestions, therefore, honestly put forward as likely to exercise a steadying influence upon this, our chief article of food, are worthy of most careful consideration.

The statistics I have quoted go to show how absolutely the life of this country is dependent upon our maintaining a powerful navy, which shall be able, at all times and in all circumstances, to keep open our ports.

I now turn to the recent Session of Parliament (1905), and note briefly the legislation which has been attempted

and accomplished, so far as it affects us as a professional body.

"The Agricultural Rates Act," for the relief of agricultural land by a rebate of half the rates, was first passed in 1896 for five years, against a very strong opposition, it being described as a "dole to landlords." In practice, however, it has proved of great benefit to the occupiers of land, and it is not the fact, speaking generally, that the landlords have benefited from it at the expense of their tenants.

In 1901 it was renewed for four years, again arousing much opposition in the House of Commons, and last Session it was again renewed, but on this occasion with practically the concurrence of both sides of the House.

It is to be hoped, therefore, that those politicians who formerly doubted the wisdom or justice of this measure have since been converted to the views of the Royal Commission on Local Taxation, who, in their Final Report, stated that they considered "it to be well-established, "that in view of the character of agricultural property, "the amount of the produce and profits derivable there-"from, and the relative extent to which benefits accrue "to the property and to its occupier, by reason of the "expenditure incurred by the local authorities, it would "be inequitable that rates should be paid in respect of "it on the basis of its full annual value." They then went on to recommend that, for all burdens of an onerous character and for the cost of the maintenance of local highways, agricultural land should be assessed at half its rateable value, and that, in respect of other burdens, where the case of the agricultural ratepayer was dependent, not only upon his inferior ability to pay, but also upon the meagre extent to which he was benefited by much of the local expenditure incurred, he should

continue to be rated at one-fourth, as under the Public Health Act, 1875, and other similar enactments.

Until, therefore, the whole question of local taxation has been revised on the lines of the recommendations of the Royal Commission, it is, in my opinion, absolutely essential for the welfare of the agricultural interest that this measure should remain upon the Statute Book.

To the energy of Mr. Mount, the Member for South Berks, we owe the "Compensation for Damage to Crops Act," originally known as the "Sparks Bill." The want of such a measure has been much felt by the farmers, who have suffered great injustice at the hands of the railway companies from the destruction of their crops by sparks from passing engines, without receiving any compensation for the loss sustained. The Act, as passed, was to a certain extent a compromise, but the injustice will now be remedied by the payment of compensation up to the sum of £100.

Two measures introduced by the President of the Board of Agriculture and Fisheries have been unfortunately allowed to drop, viz. the "Butter Bill," the object of which was to prevent the addition of moisture to butter, and to ensure a pure and genuine article; and "The Dogs Bill," to prevent sheep-worrying and to place restrictions on loose and unowned dogs—a much-needed and useful measure.

Although expressing regret that these useful bills were allowed to drop, may I, at this juncture, venture, on behalf of The Institution, to say how much the country at large is indebted to the President of the Board of Agriculture and Fisheries, and his able and efficient staff, for the excellent work which has been done in stamping out disease amongst our flocks and herds, and the wise and beneficial precautions, in inspectorship and otherwise,

which have been taken at our ports to prevent the introduction of disease from abroad.

It is somewhat the fashion to decry the Board of Agriculture, but I conscientiously believe that the Right Hon. Ailwyn Fellowes and his predecessors in office have shown every desire to assist the agricultural interest, and are always willing to consider and advise upon any subject in connection with the land which may come strictly within their purview.

In particular, I should like to refer to useful work which the Board has recently carried out in two directions, (1) by the issue of leaflets, and (2) by using their influence with railway companies to arrange conferences with agriculturists for the discussion of questions connected with traffic facilities or charges.

These leaflets, some 156 in number, cover a very wide field of information, and are too little known, so that, if any words of mine draw attention to their merits, I shall feel that the time I have spent in the preparation of this address has not been altogether in vain.

They have now been classified, and are issued in eight sections, obtainable at a cost of one penny each, viz:—

1. Miscellaneous subjects, *e.g.* Farmers and Local Rates; Farmers and Income Tax, &c.
2. Farm Animals—diseases, &c.
3. Poultry and Bees.
4. Farm and Garden Crops.
5. Wild Animals and Birds.
6. Insects injurious to Crops.
7. Insects injurious to Fruit and Forest Trees.
8. Fungi injurious to Crops and Fruit.

All interested in rural and agricultural matters,

whether as landowners, tenants, or agents, will find valuable information in the pages of these little publications.

The attempt to cultivate more friendly relations between agriculturists and railway companies was first made by the late Mr. Hanbury, and his initiatory efforts have since been ably seconded and extended by his successors, Lord Onslow and Mr. Ailwyn Fellowes. A circular letter recently issued by the Board of Agriculture draws attention to the advantages which may be anticipated as a result of local conferences, at which representatives of the railway companies might attend to discuss with agriculturists any questions which presented themselves for settlement.

Several such conferences have already been held and have been attended by excellent results, and Mr. Fellowes now suggests that, where difficulty is experienced in disposing of agricultural produce owing to delay in transit or heavy cost of carriage, or where there is reason for complaint owing to some anomaly in rates or insufficiency of traffic facilities, the Board should be informed of the difficulties in question, with a view to a conference being arranged between the complainants, the representatives of the railway company, and an inspector of the Board.

Among other legislation which has now received the Royal Assent is the "London Building Acts (Amend-"ment) Act, 1905."

On your behalf, the Council opposed, in the Commons, the many drastic and undesirable provisions contained in the Bill as introduced, making it clear, however, that their opposition was disinterested, and actuated only by the desire to secure legislation which might prove of real

value to the metropolis. The Institution was again represented by counsel before the Private Bills Committee of the House of Lords, with a view to assisting their Lordships to still further improve the Bill as amended by the Commons, and thus to place upon the Statute Book a measure which might prove both workable and beneficial.

In both Lords and Commons considerable weight was evidently attached to the suggestions put forward by The Institution, and while many improvements of lesser importance were effected, it is satisfactory to be able to report that, as it now stands, all requirements under the Act are subject to appeal to the Tribunal of Appeal, whether they apply to new or existing buildings.

The Institution is much indebted to a small Committee of the Council, experts in this particular work, for the trouble and time they gave to drawing up objections and proposing amendments to the complicated clauses of the Bill.

The heavy expenditure to which The Institution has been put in opposing the measure in its original crude and impracticable form has been abundantly justified, not only by the simplification of the work of the surveyor in dealing with the Act as it now stands, but still more so by the advantages which have been secured to the public in retaining for them an appeal from requirements which might, in some cases, have proved both drastic and uncalled for.

In closing these imperfect remarks, I would desire to congratulate the Members upon the present successful position of The Surveyors' Institution. But we must not be content to rest upon past achievements; this is an

age of intellectual activity and advancement, and, if we are to maintain our position in the eyes of the public we must continue to show our practical usefulness.

Above all things, if you will permit me to say so, it should be the ambition of every Member (Fellow, Associate, or Student) to uphold the high and honourable status of this Society, so that the membership of The Surveyors' Institution may be in itself a guarantee that the man possessing it is a high-minded, straightforward, and honourable member of the profession of a surveyor.

It only remains to me to thank you most sincerely for the kind attention you have given to the crude, and I fear somewhat too vague and sketchy, statements contained in this address.

Mr. GEORGE LANGRIDGE (Fellow) said he had very great pleasure in proposing a hearty vote of thanks to the President for his address. He thought all would agree that seldom had so interesting and instructive a summary of agricultural matters been read before a Meeting of The Institution. Nearly every subject of interest to those connected with the land was touched upon—the roads, the crops, and the causes of depression were all dealt with in a form which could not fail to convey useful information and furnish food for thought to the land agent and surveyor. Even if it were permissible, it would be very difficult to criticise an address which showed so great an amount of care in its preparation and so wide a knowledge of the subjects brought under review. He would, therefore, content himself

with proposing a cordial vote of thanks to the President for his able address, and in this he was sure that everyone present would heartily concur.

Mr. HOWARD MARTIN (Fellow) said it gave him much pleasure to second the vote of thanks which had been proposed to the President for his address. It was full of interesting information and useful suggestions, valuable and useful not only to surveyors, but to every one who took an interest in the welfare of the country.

There was one point in it which struck him as being particularly encouraging, and that was that a land agent of such large experience as the President should really see reason to believe that prosperity was returning to agriculture. After hearing for years nothing but the most gloomy forebodings with regard to agriculture (founded, unfortunately, on actual facts), it was encouraging to have the President's views on that point.

He could not help regretting one matter which had been mentioned as an element in the present increasing prosperity. Many who used to shoot over their own land were now compelled to let it to syndicates or, as the country people called them, foreigners, who were not always the best sporting neighbours, or too considerate to the farmers over whose land they shot. Perhaps that was a matter which, if the President's hopes were verified, might right itself.

Mr. T. H. NORTON (Fellow) said that, as an old friend of the President, it gave him very great pleasure of

endorse the words of the proposer and seconder of the vote of thanks to him for his excellent address, to which, he was sure, all present had listened with great interest, as a well-considered expression of the opinions and conclusions of a good, honest land agent, of long and wide experience in all matters connected with the profession.

The vote of thanks having been put to the Meeting and carried unanimously,

The PRESIDENT, in reply, said he was exceedingly obliged to Mr. Langridge, Mr. Howard Martin, and his old friend Mr. Norton for the kind manner in which the vote of thanks had been proposed and seconded, and for the too flattering way in which they had spoken of any little merit that his address might possess, and to the Members for their kind response to the vote.

He had, in his time, had occasion to write many reports on many different subjects, although he did not pretend to any literary skill or ability; but he must confess that he had found the preparation of this address a matter of greater difficulty than anything he had ever before undertaken.

He would only now reiterate what he had said on rising, that he should always be pleased to do anything in his power to maintain the high standard and integrity of The Institution, whose interests, he was sure, every Member had so much at heart.

### THE COUNCIL GOLD MEDAL.

THE PRESIDENT said it gave him much pleasure to announce that the Council had unanimously decided to

award the Gold Medal, offered annually for the best Paper read at an Ordinary General Meeting during the Session, to Mr. Edward Morten for his Paper on "Surveyors' Reports and Certificates." This decision had been arrived at after a very careful consideration, by a large committee, of the merits of the many interesting Papers read, by Members and others, during the Session 1904-05.

The Meeting then adjourned.

No. 489.

AT

# THE ORDINARY GENERAL MEETING,

*Held on Monday, November 27th,* 1905.

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CHARLES BIDWELL (President) in the Chair.

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The discussion on the Paper read at the Ordinary General Meeting of The Surveyors' Institution on Monday, May 15th, 1905, by J. D. Wallis (Fellow), entitled "The Licensing Act, 1904, with special reference "to the questions of compensation and monopoly value," was resumed.

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## Presentation of the Council Gold Medal.

Before calling upon Mr. G. M. Freeman, K.C., to speak,

The PRESIDENT said it was his very pleasing duty to present to Mr. E. Morten (Barrister-at-Law) the Gold Medal awarded annually by the Council for the best Paper read during the session. He was sure it would be agreed that Mr. Morten's Paper on "Surveyors' Reports "and Certificates," read at the Ordinary General Meeting of the 13th March last, would prove a most useful and instructive addition to the "*Transactions*," containing, as it did, an immense amount of information and expert advice in a clear and concise form. The Papers read were all of high merit, and great care had been taken in making the award, but in the end the Council

had come to the unanimous opinion that Mr. Morten's Paper, judged from every point of view, was most worthy of the distinction which he had now the pleasure of conferring.

The discussion was then resumed by—

Mr. G. M. FREEMAN, K.C. (Associate) who said that having read Mr. Wallis's Paper from beginning to end more than once, he wished very candidly to say that he thoroughly endorsed all that had been said as to its very valuable character, and he was sure that The Institution owed a debt of gratitude to Mr. Wallis for the trouble he must have taken in its preparation.

He noticed that the author, with characteristic modesty, had aimed, not so much at expressing his own views, as at leading discussion in order to elicit useful opinions; but he, for one, could not overlook the solid value of the information contained in the Paper.

Before passing to details he would refer briefly to the Act itself. He wished now to speak, not as counsel or as an Associate of The Institution, but rather as a licensing magistrate, and from that point of view he was prepared to say that the Act had been of enormous benefit and would be of still greater assistance to magistrates in carrying out their work. It had been, he was sure, the feeling of all magistrates that there were numerous licensed houses which they would be heartily glad to see swept away, and which they believed the owners would not be averse to getting rid of if it were not for the fact that their abolition would entail a severe penalty on the owners themselves, and perhaps still more on the occupiers who carrried on business in these places. Now that provision was made that, except in a case of mis-

conduct on the part of the persons carrying on the trade, or of the owner in not keeping the premises in proper condition, compensation could be given, he thought the road would be cleared for getting rid of many troublesome places of the kind, particularly in the smaller towns and villages.

He thought that in the working of the Act both sides would, in most cases, be at one in carrying it to efficient results, and that the brewers generally would cordially and loyally co-operate with the licensing authorities. It was obvious that in many cases the sweeping away of undesirable houses, which could not really be so carried on as to make an honest living, would be welcomed by everyone, so long as reasonable compensation could be given.

The only difficulty he foresaw in carrying out the Act would not be raised by the large brewers owning a number of houses, but rather by the small men who had each a single house, and perhaps no other way of getting a living if that were taken away. Those were the people who had fought most against any reduction of licenses; but he thought that, under the Act, it would now be possible to meet such opposition.

The Act seemed likely to be a great success. Whether the funds produced would be sufficient to fully carry out the desires of its best wishers was perhaps, he feared, another question. One county authority, which he could name, was at first under the impression that they had provided a sum sufficient to compensate for the extinction of about sixty licenses, to be spread over some three years, but the brewers had been successful in absorbing the whole amount on the first eight houses. The result was gratifying to them, perhaps, but hardly so the authority.

The provisions of the Act which most affected the Members of The Surveyors' Institution were those dealing with the basis upon which compensation was to be paid in future, and with the somewhat curiously-named "monopoly value" in the case of new licenses.

The principal question was, of course, that of compensation, and it struck him, on hearing observations on the Act, and even on reading Mr. Wallis's Paper, that there was a slight misconception concerning this. It appeared to be suggested by many that some new principle of compensation had been introduced under the Act, and that their old, esteemed, and he might say revered friend the Lands Clauses Consolidation Act was going to be put ignobly in the background. That would be exceedingly regrettable, but he did not think it was going to happen. He thought the difficulty had been that those interested did not quite appreciate what they were going to be compensated for, or what was to be taken away. It was not the house that would be taken away, for that would always remain the property of those who now owned it. It was the license which was to be taken away, and the parties interested were to be compensated for the loss of the additional value given to the premises by the license. That, it seemed to him, was exactly what the Act was designed to do. If a place remained on the owner's hands, it was obviously necessary to ascertain what it would be worth to him after he had lost the license, and the only fair compensation represented the difference between the value of the premises with the license, and of the same premises without it.

He did not think that any insuperable difficulty need be found in ascertaining those points. He had not yet discovered any timidity on the part of surveyors in esti-

mating the value of licensed property, and he had never known them hesitate to fix the value of a place that had not a license attached to it. He did not, therefore, believe they would find any difficulty in ascertaining the value in the former case and in the latter, and subtracting the one from the other.

Then it has been said that considerable confusion might arise because certain elements, enumerated in the Act, were to be taken into consideration. For instance, the fact must not be ignored that the magistrates had certain rights which were not taken away from them by the Act. They had a perfect right, if a place were conducted in an improper manner, to refuse a renewal of the license. If a place were unfit, from a sanitary or from a police point of view, they were empowered to refuse a renewal, and it had been laid down in the House of Lords that if a public-house were objected to by the neighbourhood in which it existed, they could refuse a license. Those elements were not, in his opinion, difficult for surveyors to take into consideration.

Supposing such a case were referred, apart from the Act, to an arbitrator, he would certainly consider, if it were pointed out to him, that there were certain elements of risk arising from the way a house was conducted or built, which rendered it more liable than another, built in accordance with modern requirements, to be interfered with. As a matter of fact, he thought the Act had practically reduced to absolute simplicity the conditions under which the magistrates might declare that a house should not have its license renewed, when it was no longer necessary or advantageous to the neighbourhood. He thought that, inasmuch as Parliament had given the governing authority power to deal with this question at their discretion, no arbitrator would give undue weight

to the consideration that magistrates might, under the old law, have refused the license if it were no longer required. Therefore, it seemed to him, that the position of the owner of a house was now much more impregnable than formerly.

Now what was the practical manner in which these cases would come forward? He supposed that certainly in nine cases out of ten a licensed house was owned by the brewer, who had in it either a tenant or a manager who, under the Act, was entitled to be treated as having an interest not less than that of a tenant from year to year. It was, therefore, a comparatively simple matter to decide what was the brewer's interest in the house. Nothing in the Act altered the basis on which he was to be treated. This interest was a right to supply all the beer consumed in that house, and there was no difficulty in ascertaining from the brewer's books how many barrels of beer he supplied.

When one dealt with the profits of the house, all sorts of difficulties might arise, for, in many cases, the man did not keep books, had only the most hazy ideas of his gross profits, and was even uncertain as to his working expenses; but if one took, as a basis, the number of barrels supplied by the brewer, there would be no difficulty in ascertaining what the amout of trade was.

Then it should be easy to calculate the brewer's profits on those barrels. Certain circumstances must be taken into consideration: for instance, the distance between the house and the brewery would make a difference. If it were one of six or seven adjacent houses at which the barrels could be easily delivered it was different from the case of an isolated house. All these were matters which surveyors would take into consideration, and it could be easily ascertained what, if any,

were the exceptional circumstances. This having been determined, then came the question of capitalisation. To this, again, there were certain well understood limits. One must consider the probability of a license being interfered with, and must also allow for the structural condition of the house, the character of the trade and its risks, and whether it was likely to be objected to by the police, or subject to complaint from the neighbours. He submitted that there would be no difficulty in determining what the multiplier should be, whether 9 years or 12 years, as in a recent case where the latter had been accepted as being the multiplier for such a property.

Thus it was possible to ascertain absolutely what was the value of the house to the brewer. If there were a lease, it merely meant apportioning the total amount of the value of the interest between the tenant and the landlord.

But this having been done, one came to another point. It was then necessary to ascertain—which was perfectly easy—what was the value of the house when the license was taken from it. He quite agreed with the author of the Paper that there would generally be more value attaching to the premises as a public-house than for any other purpose. It might possibly be that both parties agreed that the value of the place unlicensed, if let, would be equal to its value as a licensed house, less the value of the license. All one had to do was to ascertain the difference between the two rents and deal with it on a proper table. If freehold, say 20 years' purchase, and take off the cost of altering the place from a public-house to ordinary trade premises.

Those were the lines on which were settled the only cases of which he knew, and he had found, as a

rule, that a magistrates' committee was a tribunal that would do perfectly fair justice to the brewers.

There remained the question what was going to be done for the tenant. It seemed to him that one could not consider a tenant, according to the Act itself, as less than a yearly tenant, but supposing the man had been there 8, 10, or 14 years, he was differently treated from what would be the case if he had been there only one or two years. He had established his position and had possibly given a considerable amount of purchase money in the expectation of being in possession for a considerable time.

The only case where he thought hardship was likely to arise was where a man had paid a large sum to go in and was interfered with by short notice, but that could generally be satisfactorily arranged between the owner and the occupying tenant.

He observed that, in the Paper, Mr. Wallis very fairly pointed out that the first tribunal—a committee of magistrates—had no power to settle compensation. It was a curious provision, but apparently they were to sit only to receive offers from persons who were going to be dispossessed, and could decide nothing unless all the parties agreed among themselves. That sounded at first as if every case would go to the Inland Revenue Commissioners to be dealt with. All he could say, as the result of his own experience, was that, if the matter were dealt with in an absolutely practical manner at an early stage, the difficulty would be easily met. The line he took with a committee was: "We are here before you—"you have your expert and we have our expert. It is a "thousand pities to follow only the strict technical "wording of the Act—let us talk the matter over, and "if you will indicate what you think is a reasonable

"sum to award, we will consider among ourselves if we "can accept it, and then put it forward as an indepen- "dent proposition." That was, he thought, the way one had generally to deal with an Act of Parliament, and if it were not for the intelligence of members of the legal and surveying fraternity, it was often difficult to see a way out of the complications by which many Acts were obscured.

The magistrates were not at first prepared to accept this view, but having heard a few cases they saw facts which they were able to accept. Unless it were a very bad case indeed, if one had gone to the expense of consulting witnesses and bringing them up and examining them, it was better to accept the risks one had than to fly to others that one knew not of, in the shape of the Inland Revenue Commissioners.

He believed that, if a reasonable give and take principle were observed between the parties in that way, matters could be settled very easily, and an unknown amount of expense be saved, which expense had to be taken in the first place out of the compensation fund. If everyone appealed to the appointed tribunal it might well happen that so large a proportion of the compensation fund would be swallowed up in preliminary costs, that very little would be left for the claimants. He remembered a fund being formed some years ago for compensation in respect of houses let down by brine working, but for years not a farthing was available for the people whose houses had disappeared; it was entirely consumed by costs. In all such cases, it was better to give way a little on each side.

He had only a few words to say with regard to new licenses and the so-called "Monopoly Value." He commended that section of the Act as a model of the way in

which any simple statement could be confused by the legislature.

Why this payment should be called "Monopoly "Value," he did not quite understand, unless it were suggested that all the other public-houses in a place were to be abolished—but so it was called. The question of monopoly value had not the same importance as compensation, for the granting of a license was hedged about with so many complications that he thought very few would be willing to come forward and ask for new licenses, which at the present time the magistrates were extremely chary in granting. As far as he understood the section, it enacted that the magistrates were to ascertain in some way what the value to a licensee would be of having a new license granted, where at present it was virgin soil, unnoccupied by any existing public-house, but their decision was to be tempered by these two facts—that they must only exact from him such a price as would enable him to put up premises to answer sanitary and police requirements, and must not compel him to run the thing on such lines that it could not be properly managed. Those, he thought, were the two limitations which the Act put on monopoly value, and he did not think there should be any insuperable difficulty in ascertaining what that monopoly value was. In a district which had a reasonable prospect of being shortly occupied, one could estimate what would be the probabilities with regard to the trade of the house and the cost of maintenance; and those things having been ascertained, he thought surveyors would be able to advise a brewer what would be a fair sum to offer in order to obtain the right to establish a house.

On one point which Mr. Wallis raised there was, he thought, no doubt. It was possible that the words of

the Act seemed to contemplate money payment, but he could not think that any reasonable authority would not rather have one or two undesirable houses surrendered than have money payment with those houses still existing.

There was little doubt that if an owner of three or four houses, which he knew the authorities wanted to get rid of, went to them and asked, in exchange for these, for the right to put a new house in a new district, they would be prepared to accept that as equivalent to money payment.

The Act was, perhaps, difficult, like all Acts of Parliament, but it was one which, viewed in the light he had suggested, ought, he thought, to prove workable, and it certainly seemed to him designed to remedy the extremely undesirable condition into which licensed trade had fallen. Times had changed, and places which had been perfectly properly licensed years ago, had become not only unnecessary but a nuisance. In the ancient town of Eton, it had been discovered that there existed a public-house to every $72\frac{1}{2}$ of the inhabitants—he did not know where the half inhabitant went, but that was a detail. If, by a reasonable application of the funds at the magistrates' disposal, that which had become a nuisance to the place itself could be done away with, he ventured to think the Act would prove to be an extremely useful one, and he would suggest that it should be met in a reasonable spirit, avoiding technical disputes and carrying out its provisions on the broad basis of common sense.

Mr. C. J. LAKE (Fellow) said that two or three points had occurred to him in connection with the cases he had had under the Act.

The hardest cases were, it seemed to him, those of the occupiers of the tied houses, who were also the licensees. In so many cases the licensee had but a year or eighteen months' tenure, and if he were doing well, it was hard to say what was a fair compensation for his loss. To be sure, he did not, as a rule, claim a large amount—in fact a licensee was generally very reasonable in his claim, and one had little difficulty in allowing practically all he claimed, and even in some cases more, for the man was put out of his trade for a while, and it seemed reasonable to allow something for the time wasted before he could find another to take its place. There were also certain expenses incurred in finding fresh employment, but on that point the Act gave no clear guidance. As a rule, a licensee was a hard working man, and it was sometimes a little astonishing to find that, with a turn-over of, say £1,000 a year, he was making perhaps less than 30*s*. a week, and in justice, his compensation should equal his loss.

One found that, as a rule, the most difficult case to advise on was where the claimant was the brewer. There was so much difference of opinion as to the amount per barrel, and the multiplier. It was often impossible for the two sides to see eye to eye in that respect, and to a surveyor in general practice it was sometimes difficult to determine the genuineness of the claims brought forward. He thought it was generally undesirable that, as was often the case under the Act, the licensees should be represented by the same persons as the brewers. He did not intend to suggest any slight on the gentlemen who acted for both, but he thought it a pity that they were not separately represented.

A question which had arisen in his experience, and which was a little difficult to determine, was with regard

to loose chattels. How much of the value of the loose chattels should be allowed in the goodwill? Where there was a claim for goodwill, and it was shown that a certain sum nad been paid for chattels, one knew it was generally much more than they were worth, and would not have been given except in connection with the goodwill.

Mr. J. MARKS (Visitor) said that as a non-Member, but as one greatly interested in the subject under discussion, he was indebted to the Members for affording him this opportunity of offering a few remarks on his own experience of the working of the Act. He proposed to deal first with the basis of compensation, and secondly with the value of the license. On page 441 of the *Transactions*, Mr Wallis said: "under this Act, it is "clearly set out that a sum is to be paid equal to the "difference between the value of the licensed premises "and the value which those premises would bear if they "were not licensed," and later on he said: "This defi- "nition of compensation would appear to confine the "amount to the reduced value of the premises, and to "exclude any claim for loss of profit, goodwill, or other "personal items."

He did not think the last paragraph represented the true interpretation of the Act, or that it was ever intended by the legislature that no compensation should be paid for the loss of profits or goodwill. The Majority Report of the Royal Commission on the Licensing Laws said on this point: "Without attempting to weigh "too nicely the whole of these arguments, we desire to "express—in the case of suppression of licensed premises "under the proposed scheme—our general adhesion to "the principle of compensation equivalent to the fair

" intrinsic selling value of the license and goodwill, " apart from the extreme inflation of prices caused in " some cases by excessive competition."

Now the value of a license depended, he thought, entirely on its profit-earning powers, and to exclude the loss of profits or goodwill from consideration, when estimating the value of the licensed premises, would be to cause very grave injustice to the interested parties, especially when it was considered that the trade itself provided the compensation fund. On that point he would quote Mr. St. John G. Micklethwait's work on the Licensing Act of 1904:

" The value to be ascertained is, it is submitted, the " fair market value of the licensed premises treated not " as a mere structure but as a going concern, *i.e.* the " premises as licensed premises with the goodwill " attached to them, at all events so far as the goodwill " is attached to the premises and is not purely personal " to the occupier, which he could take away from the " premises with him whenever he might voluntarily give " up his license. It may be suggested that to include " the goodwill at all is to do more than value the " premises, and is to give something in the nature of " trade compensation. The object of the valuation " however, appears to be to ascertain the amount of " compensation payable for the loss of the license which " has been extinguished, and it is submitted that to omit " from the calculation such goodwill would be to neglect " an important element in the value of the license. It " is not as if the licensee can at once remove his business " elsewhere, because, *ex hypothesi*, his business which " depends on the license is gone, and if he wishes to " obtain fresh licensed premises he must either buy them " in the market, or, if he can obtain the grant of a new

"license, buy it from the public under this Act. By "Sub-section 2 it is provided that the license-holder is "to have a share in the compensation, and that, in "making the division, his conduct and the length of time "which he has held the license are to be taken into "consideration."

Now he believed it was generally considered that the capitalised loss of profit or goodwill should form part of the compensation claimed, and he thought it was only common sense that, where a man's business was taken away, he should be compensated for loss of profit or goodwill. He presumed that, when valuing under the Lands Clauses Act, it would be admitted that the goodwill should be included. What difference could it make in valuing premises whether the value was ascertained under the Licensing Act, the Lands Clauses Act, or any other statute? Surely the value of the licensed premises must be the same, under whatever Act they were valued. So much for the basis of compensation.

Now, as to the value of the premises with the license, Mr. Wallis said, "Before arriving at the capital value "for the purpose of assessing the compensation, it will "be a matter of importance to find the true annual value "of the premises, which will be depend upon the trade "done," and later on, "One well-known method which "has been applied to the valuation of licensed houses is "to assess the annual value of beer-houses at £10 per "barrel of beer sold each week, and another rule, which "includes full licenses and beer-houses, is to take the "annual value at the amount of five weeks' gross takings, "or 10 per cent. of the average annual gross takings "over a series of years. This method is frequently "adopted, and has sometimes been followed by quarter "sessions in rating cases." And, having ascertained the

net annual value, he capitalised it at 25 or 30 years' purchase.

He thought it was not difficult for a qualified surveyor to ascertain the value of unlicensed premises, nor for an experienced valuer of licensed properties to ascertain the capitalised value of licensed premises. He would not, however, advocate the adoption of the method set out in the Paper. He would not assess the value by taking £10 per barrel or the gross takings, both of which methods were misleading by reason of the varying nature of the profits derived from different licensed premises. Again, why should an arbitrary 10 per cent. on the takings be the basis of ascertaining the value? It was within the knowledge of most, if not all, valuers of licensed premises, that the gross profit derived from the trade of a licensed victualler varied from 35 per cent or less to 50 per cent. or more. Where then was the justice of taking 10 per cent. on the takings to ascertain the capital value? Take two houses, each with a turnover of £5,000 a year, working expenses being the same in each case, one bringing in a gross profit of 35 per cent. and the other 50 per cent. By the 10 per cent. method each would be of equal value, although one made a gross annual profit of £1,750, and the other £2,500.

To attempt, therefore, to value licensed premises on an arbitrary percentage of gross turnover was, he submitted, quite misleading, and the same remark applied to the £10 per barrel per week method.

On the last occasion a speaker said that the true basis for ascertaining the capitalised value of a public house was to take the rateable value as the true annual value. He thought the rateable value was a more unreliable basis, if possible, than a percentage on the gross takings, or £10 per barrel of beer per week—for instance

the quinquennial assessment had just been made, and his experience showed that in one borough (which should be nameless) the Assessment Committee adopted the principle of 10 per cent. on the takings as the basis for ascertaining the rateable value of the houses. In a neighbouring borough, the Assessment Committee took six weeks' takings, which was equal to 11½ per cent. per annum. A third borough took the rent reserved by the lease, plus 10 per cent. on the money value of beer supplied to the house, and another took the rent, plus 15 per cent. on the value of the beer. A fifth Committee took the rent of the house, plus one-third of the rent, and a sixth took the rent, plus 5 per cent. on one-half of the premium value. It was possible that some one of these methods might be correct, but all could not be. The true principle was to get at the net annual profit derived from the user of the license, for until some uniformity of rating was arrived at, the rateable value could not be said to represent the true annual value. He suggested that the only fair way to ascertain the value of licensed premises was to capitalise the ascertained net annual profit, not by 25 or 30 years' purchase, but by such number of years' purchase as the experience of a valuer would tell him was fair, after giving full consideration to all the circumstances connected with the particular property, adding thereto the value of the property *quâ* property. It was possible thus to arrive at the true value of a freehold licensed house. He had been fortunate enough to have been associated with Mr. Freeman in the cases to which he had referred, which cases it had been possible to settle by adopting a policy of give and take with the justices before whom they were brought. In some cases he had acted for the brewers, and in others had the pleasure of representing the justices and advising them.

With regard to the monopoly value, he had very little to say. The matter was all more or less in the air, and he did not feel on such sure ground as when dealing with cases of compensation, but he thought the method of apportioning a certain part of the estimated net annual profit was the proper one. He had only had to advise on two cases of monopoly value, and in both of those cases the Justices adopted the figures he laid before them, and the applicants for the new licenses appeared to be well satisfied to accept their licenses on those terms.

Mr. E. JOHNSON (Visitor) said he had listened with much pleasure to the learned gentleman who had resumed the discussion on the present occasion, and he was sure he would allow him to say that, while he agreed with the main points of his speech, he was inclined to think he had not carried the matter much further on the question of compensation. The Act was passed for that purpose, but the prevalent idea seemed to be that the brewers were the only persons particularly interested in it.

The origin of the Act, was, he thought, as follows: the Justices of the Peace to whom, as their name implied, was confided the peace and good order of the divisions over which they exercised jurisdiction, had repeatedly expressed an opinion that social progress would be insured, and the welfare of their divisions advanced, if they were empowered to take away some of the licenses which had reasonably been granted in years past, but which, the surrounding conditions having changed, were no longer required. He was quite aware —in fact he thought he might say that, before the case of *Sharp* v. *Wakefield*, every one having an intelligent

acquaintance with licensed property, perfectly well knew —that the Justices had the power to refuse licenses from year to year, and the only effect of *Sharp* v. *Wakefield* was to make clear to the public generally what members of the legal profession and others interested in licensed property well knew before. It was one of those cases in which an enthusiastic friend of the trade, a distinguished member of the legal profession, who unhappily was no longer with them, was sanguine that he could get a decision in favour of his clients, and, contrary to the view of many leading members of the Bar, believed in his case up to the final decision of the House of Lords, which emphasised the powers of magistrates to refuse renewals. Then the magistrates said, in effect, that, while they recognised the fact that they had the power, they were humane men as well as Justices, and were deterred from doing what they believed would be for the benefit of their neighbourhood by refusing, from time to time, the renewal of redundant licenses, because they hesitated to deprive so many people of their property and means of livelihood. Then the Government stepped in, and endeavoured to place them in such a position that they could do, without violence to their sense of justice, that which they felt was necessary to properly discharge the duties entrusted to them. A Bill was brought in to enable them, without injustice, to refuse the renewal of redundant licenses.

In the inception and carrying through of this Bill, brewers were in no way specially concerned. In fact throughout the Act the main consideration was for the public and the occupiers, and the brewers only came in incidentally with other persons who might have an interest in the property. That, he ventured to submit, was shortly the history and the intention of the Act.

Some of the points raised by previous speakers related to the great difficulties there would be in administering the Act. New licenses had been referred to in connection with monopoly value. Speaking as a representative of the licensed trade he might say, without the slightest reservation, that there was a wish and intention on the part of all interested to loyally observe the Act and to give to the various benches of magistrates and to Quarter Sessions every possible assistance in carrying it out.

He might reserve approval of two points—one was the source of compensation, and the other was the difficulty about new licenses. He was relieved to hear the opinion expressed by the learned gentleman who opened that evening's discussion with regard to new licenses. It had always seemed to him that the section of the Act which dealt with this point regarded the monopoly value as a money payment.

He believed that if all magistrates took the same broad view of their power as the learned gentleman who, as he understood him, was himself a magistrate—it would very greatly benefit the applicants for new licenses, and would give those facilities that new neighbourhoods might require. Thus would be accomplished what Parliament intended in passing the Act, *i.e.* a great diminution in the number of redundant licenses without the infliction of any hardship on anyone concerned. He believed the trade generally would much appreciate the application of the Act in the direction which Mr. Freeman indicated, and would prefer the surrender of redundant licenses in the place of monetary payments for new licenses.

The last speaker alluded very properly to the extreme difficulty of assessing compensation for new licenses

absolutely untried. Whatever monopoly value might be fixed must, he thought, be purely conjecture. It could only be arrived at by taking a house, similarly situated, amid a similar population, at a certain time, in circumstances as nearly alike as possible. It would be a purely gratuitous assumption that the premises to which a new license was to be attached might possibly do the business thus arrived at.

Looking at the matter entirely as a layman, the only basis of compensation he could conceive was that the dispossessed persons should receive compensation equivalent to the loss they sustained by the non-renewal of the license. As Mr. Wallis had pointed out, the premises deprived of the license would, in many cases, have no other than the ground value, because in that particular trade—unlike many other trades—a large proportion of the houses were designed and built expressly for a particular occupation, and when deprived of the power of carrying on that business on those particular premises, they were no longer of any value nor adaptable to any other purpose. He had now in his mind a case in which nothing whatever could be done but to clear the ground and then erect a new building suitable for another purpose. It was much easier to adapt ordinary business premises to other trades than to alter a licensed house designed for a special purpose. In nearly every case when it was proposed to build an entirely new house the designs had to be submitted to, and approved by, the justices, who only approved them if they were specially fit for the purpose for which a license was sought, and even where old houses had been adapted, the alterations had been approved by the licensing authority. The main thing to be desired was the fixing of some equitable basis of compensation which he could not conceive on

any other lines than, first the calculation of what a man had lost and then the award of such a sum as would, if it did not put him in a position quite as good as if he were still enjoying a license, at least minimise his loss as much as possible.

It was the desire of the licensed trade when this question was first agitated that compensation should be given under the Lands Clauses Act, which would have made it easier for surveyors and have been more satisfactory to the trade, but, for reasons that he would not then go into, there was no chance of passing it through the Houses of Parliament on a basis of that kind. He was inclined to think that if Parliament had given the magistrates power to allow removals, even more than they now possessed, the object desired by the justices of the peace would have been achieved without necessity for compensation. He ventured to say the Act was passed with a desire to assist the justices in what they, with more or less sound judgment, thought would be advantageous to the districts over which they ruled.

He did not quite follow the last speaker as to the principle of assessment. He understood him to say that, in some of the districts where he had acted professionally, the Assessment Committees proceeded on the ascertained takings of the house. But that must be on a voluntary admission of the person interested, because, as Mr. Marks well knew, no one was bound to give that information. An assessment committee might adopt various plans to ascertain the annual value of the house and the amount of business done, but, for the purpose of compensation under the Act, he ventured to think that all persons concerned would be acting wisely in giving their advisers —both members of the legal profession and surveyors— the fullest information, and affording the proper tribunal

every assistance in that respect, when he had no doubt they would be treated with consistent generosity. They should make clear to the authorities what was the amount of their profits, and so place them in a position to judge what would be the loss by the non-renewal of the license. A man deprived of his means of livelihood should be placed, as nearly as circumstances admitted, in the same position as before his property was taken away for public purposes.

He did not propose now to deal in detail with the various sections of the Act, because, he ventured to think, the main object of the discussion was to consider how compensation cases could be most equitably carried out without any undue expense to the persons interested, and to minimise, as far as possible, the inevitable loss which the person deprived of his licensed property would suffer.

There might be some isolated cases—he thought they would be very few—where the persons interested would not lose by non-renewal of the license. There was a case some months ago before a renewal authority who had given notice that a certain license would not be renewed on the ground of redundancy, when the license-holder and another person interested in the property concurred in the non-renewal of the license, from which he inferred that they would be gainers by the loss of the license with compensation.

There might be effete property, which had worn itself out, and which owners would gladly sell to the public when they were unable to sell to private buyers. In such cases owners would be better off than if the licenses were renewed.

But in other cases, however liberal the tribunal with whom rested the award of compensation, the licensees

would really not be as well off, whatever was awarded to them, as they would be from the profits derived from the active exercise of their calling.

For himself, he had not the slightest doubt that members of the surveying profession, to whom would be entrusted these very difficult and delicate matters, would act fairly and honestly do their best for the parties. As he had said, he could see no other way of calculating the compensation, but on the basis of profits earned over an average of years. He did not expect that in large undertakings the person dispossessed would get such compensation as would give him the same annual income, but what one should strive for was to give him an adequate equivalent for what he had lost for the alleged good of the public.

He was afraid it was impossible to arrive at any definite general conclusion on these matters, inasmuch as every case would have to be considered on its merits. He was sure everyone concerned felt that the justices and committees of Quarter Sessions would base their decisions on broad and generous principles. The Act was intended to help them in their labours, without compelling them to take away the living of men who had done nothing objectionable, or contrary to the laws under which they carried on their particular trade.

Mr. W. MACKENZIE (Visitor) said he would not now consider the basis on which compensation might or should be assessed, or the principle on which monopoly value should be arrived at, for those matters had been fully dealt with by previous speakers; but he should like to express an opinion with regard to the question, which Mr. Johnson and Mr. Freeman had referred to, whether there was power under the statute for the licensing justices to

accept surrenders in satisfaction of monopoly value. It was an important point upon which he thought there would be conflict. He was rather inclined to agree with Mr. Wallis that there was no power to accept anything but a money payment for monopoly value. In the first place the section spoke of money payment being obligatory. It would be remembered that the section, after saying that conditions might be attached to a new license, went on to say, among other conditions which should be attached (not might be attached), was payment as to monopoly value. It drew a distinction between the conditions imposable at the discretion of the magistrates and a condition that was obligatory, *i.e.* if they made up their minds to grant a new license, they must fix the monopoly value. They might make such conditions as they pleased, but he apprehended it was obligatory on them to assess the monopoly value.

And must not monopoly value be money payment? He ventured to think it must be, for, later on, the section dealt with what was to be done with this monopoly value, which was to go to a different fund from the compensation fund. Supposing three or four licenses were surrendered for a new license, instead of a payment in money as representing the monopoly value, that would be an advantage to the compensation fund, whereas if a money value representing the monopoly value were made that would go to a fund in aid of local rates. On those grounds he thought it was clear that monopoly value must be in the form of money payment. Whether that was just or unjust he did not pretend to say. He was only endeavouring to express his view on the interpretation of the section. The brewer might obviate the necessity of having to make a money pay-

ment by applying for a removal order instead of a new license; for the High Court had held that in the case of a removal order no money payment could be extracted.

Another reference in Mr. Wallis's most able and lucid Paper was to site value, and how site value was to be dealt with in assessing compensation.

He was inclined to think that the site value was not to be considered, for the statute distinctly referred to dealing with the question of licensed premises. "Licensed premises" had a well defined meaning—a building with a license. If a building were burned down and not one brick left on another, there would clearly be no licensed premises, but only the site. It was necessary in fixing compensation to arrive at the amount of difference between a building as it stood with a license, and the same building when it had lost its license. If it were to be said, when a building had lost its license, that it was to be pulled down and the site sold, it would be going away from what the statute intended, which was that the difference was to be taken as between the same premises licensed and not licensed.

Another point which Mr. Wallis had raised might, it seemed to him, involve some difficulty in working. He referred to the liability of a lessee when his license was taken away. Was he to continue to pay the full rent of his premises? Was the brewer to be obliged to pay the full rent reserved under his lease? Under the statute it was the persons interested in the premises who received compensation. The lessor and the lessee each received his share. Where, as in many leases, the lessee was under covenant to deliver up the premises with the license at the end of the lease, could the lessor claim damages for breach of covenant? Was it to be said

that the lessee, having taken licensed premises, was to be compelled to pay the rent after the license had gone? He ventured to think not, and for this reason, that the lessor having accepted compensation had waived his covenants. He could not expect to get substantial compensation now, and to go on drawing his rent as if he had not had that compensation.

On the other hand, was a lessee, who had received conpensation along with the lessor, to be compelled to pay the full rent all that time? If so, the payment of full rent would in most cases wipe out what he received by way of compensation.

The compensation charge, which was to be deducted from the rent, would in some cases produce hardship. It was to be paid by the licensed person and to go into the compensation fund. It was to be deducted from the rent, and the expression "deducted from the rent" raised, in his mind, two points. First, if no rent were paid, there would be no deductions, and secondly, when the manager was the licensed person he must pay the charge out of his pocket, because paying no rent he could not deduct it from his rent. Moreover, the statute gave no power, if it were not deducted from the rent (as in the case of a manager it could not be) to bring an action to recover it. Therefore it seemed to follow that a person who had omitted to deduct the charge from the rent, or who, as a manager, paid no rent, must himself bear it.

Mr. CHARLES JAMES FOX (Fellow) said he would like to mention one important point with reference to the Court of Appeal to which all these mattters had finally to come. If there were no agreement the case must go to the Inland Revenue Commissioners. He had some twenty cases during last summer in two counties and

three divisions, and four of them, having been sent to the Commissioners, had, last week, got their verdict. As far as he could make out from that verdict, they rejected altogether the principle of trade compensation. They went as he, having read the Act, expected them to do, on Schedule A, and he might say that, roughly, as far as he could make out, they had given 20 years' purchase on the gross annual value plus the tenant's interest, which practically came out at what he thought most valuers would make of the houses, without taking into consideration trade interest. That information might possibly be useful to some of the members present who had to deal with these matters, for they would have to consider in future what they would get from the Inland Revenue Authorities.

Mr. J. H. SABIN (Professional Associate of Council) said there were three points which had not been referred to, but were of much interest to valuers.

In the first place, he thought it had been altogether overlooked that there had already been a case of payment of monopoly value to a very large amount. How it was arrived at, he did not know. He had endeavoured to ascertain the figures locally, but had not succeeded. He understood that, in the village of Shirebrook, in Derbyshire, premises were erected at a cost of about £6,000, and an offer of £2,500 was made as the monopoly value of the license. But the licensing magistrates absolutely refused that offer and asked for £9,000, and, he understood, succeeded in getting it. In this case both the brewers and the temperance advocates had petitioned against the granting of the license.

Then he thought he could give, or suggest, a conclusive answer to the question why the justices should

not accept the surrender of unnecessary licenses as an equivalent for the grant of a new license. If a new license had any such value as suggested, it was obvious that the brewers would not surrender a license which had any value in itself, but would offer as a redundant license premises that had no profit in them. In his experience, those were the premises that were offered in lieu of the grant of a new license. Brewers were not so unwise as to offer that which had a certain value in exchange for that which could only have the same value, or less. He should hesitate to suggest to any of the gentlemen interested in the public-houses in the neighbourhood of Great George Street (there were five very close together) that those houses had no value, and that, therefore, they had better surrender their licenses as redundant, in exchange for a license of new premises. They would, no doubt, say to the justices: "It may possibly be well for the peace and "quiet of Great George Street and the neighbour-"hood that some of the licenses be taken away, but "they are of considerable value to us, and therefore, we "object to their being considered as redundant."

Then as to compensation value, Mr. Wallis had suggested 26 years in calculating the difference between licensed and unlicensed premises. That might possibly be the figure that the brewers would accept, but it was absolutely out of proportion. The goodwill could not be worth 26 years' purchase, even in the highest flights of imagination of those interested. He should say there were few present who would suggest that any business was worth 26 years' purchase, on valuing a lease. The value might be made up by a variety of amounts, up to the supposed freehold value, which might be 25 or 26 years' purchase, though Mr. Balfour said on presenting

the Bill that it was positively against the intention of the Government that any freehold interest should be created.

Then another point occurred to him, which had not been touched upon. Who were the persons supposed to be in receipt of the rents? He had read the section and the schedule several times, and was interested in knowing whether the whole of the persons who intervened between the freeholder and the actual occupier were to submit to a deduction from the yearly amount of their interest in the licensed premises for the compensation charge. It appeared to him that it was possible so to construe the section that everyone up to the freeholder was liable to the deduction of a certain amount in respect of payments which the actual licensed holder might make. He did not see the difficulty as to a manager, for he did not think a manager would be called on to pay. He assumed it would fall on the person who was rated, not necessarily the licensee. It could not be assumed that a manager, who might be turned out at three months' notice, could be called on to pay a rate on the premises.

Then there was a question which had arisen where the value of the site, if the license were withdrawn and the premises converted into ordinary commercial purposes, would be greater than the ground rent as it stood. Two cases came under his personal observation lately. In one the whole of the mortgage money advanced on a large restaurant had disappeared, and the lessee had gone to the freeholder with the request that he would relieve him from the burden of keeping up the license on the premises. The freeholder had generously come to his rescue and relieved him of the covenant. It appeared to him that, in that case, the free-

holder, if, under these circumstances, he would get a higher ground rent, should pay compensation to some one—but to whom, he was not prepared to say. Obviously he was not entitled, if the licensing authority found the premises unnecessary, to any share of the money awarded in respect of the suppression of the license.

Another point had not, he thought, been fully considered. What would be the result on the general rating of a district if licenses were granted for new premises?

The districts would certainly have, to some extent, an interest in the granting of licenses to new public-houses, for the ratepayers would benefit by the monopoly value paid in respect of those licenses.

If the object of the legislature was to decrease the number of public-houses, he could hardly imagine a more fatal way to go to work than to suggest that money received from what was assumed to be, more or less, an improper traffic, was to go to the community. If the compensation charge was to be devoted to the extinguishing of public-houses, the money received from the granting of new licenses should go to the same fund. He would, however, refer to this question more fully, as well as to other points, in the next number of the *Professional Notes.*

Mr. A. J. MARTIN (Fellow) said it seemed evident from the discussion that very few free houses were left in the country, but no doubt some Members present were interested, not on behalf of the brewers or tenants, but on behalf of the owners of free houses, which were generally let for longer terms than tied houses, and it was in their interest that he should like to ask for enlightenment on a small point that had recently come under his notice.

Two years ago, the owner of a free house granted a a lease for seven years, and looked on it as a seven years' lease, as the tenant undoubtedly did. But the solicitors, who were rather cautious, had put in a clause that the lease should be determinable at the option of either party at the end of the third or fifth year. That being the case, he would like to know what proportion of the compensation charge, payable by the tenant, the landlord should allow, according to the scale of deduction in Schedule 2 of the Act. Would it be held that there was one year of the lease unexpired, or three, or five? If one year, then the landlord must allow the tenant 100 per cent. of the charge paid, if three years, 82 per cent., and if five years, only 70 per cent. That was a case which had come immediately under his notice, and one could quite understand that many such complications would occur if it were not clear, when a lease was granted for seven, fourteen, or twenty-one years, whether the deduction on this account would be calculated on the basis of the whole term being unexpired or only on the unexpired portion of the term to the next break.

Mr. H. HAYWARD (Fellow) said he thought there was one point which had not been made quite clear—the claim in respect of the tenant's interest. The difference between licensed and unlicensed houses has been discussed, as well as the brewer's profits and fixtures. He assumed, from the general tenor of the speeches, though no speaker had actually said so, that the tenant's interest was also to be capitalised and added to the claim. It was clear what was to be done in dividing the compensation, but it was not so clear how his claim was to be made. It seemed to be taken rather for granted that the tenant's interest must be added, as his livelihood

was taken away, and there would be a loss on the sale of his furniture.

Mr. WALLIS said that, as the hour had arrived at which it was usual to close the Meeting, he would ask leave to be allowed to reply on the many points raised, through the medium of the *Professional Notes*, as it was impossible now to deal adequately with all the suggestions and arguments put forward. But, before he sat down, he wished to carry out what he felt to be his duty and pleasure, by acknowledging the vote of thanks that had been so cordially proposed and carried at the last Meeting, and expressing his appreciation of the way in which his Paper had been received. He should also like to say how much he felt indebted to those gentlemen who, not being Members of The Institution, had been so good as to come as visitors, and to give their views on a matter on which they were entitled to speak with authority. As far as he was concerned, he had found much pleasure in preparing the Paper, although he did not claim any greater knowledge of licensed property than was possessed by many other members of The Institution.

THE PRESIDENT said it was first of all his pleasure and duty to thank those speakers who had attended to give valuable information on the subject under discussion, and he should also like to add his meed of praise to Mr. Wallis for his excellent Paper.

As a licensing magistrate of some quarter of a century's experience, he could only say that, in dealing with such cases, it was often exceedingly difficult to know what was fair and just when the license of a house was taken away. The case of the justices was put very fairly

by Mr. Johnson, and he was glad to hear from him, representing as he did the licensed victuallers' trade, that they wished to approach the matter in a reasonable and moderate spirit. He could assure them, as far as he was concerned, it was his wish to deal fairly with all interested, and that there was no desire to use the Act in any harsh or unfair spirit. He thought the information received from Mr. Wallis, and the discussion which had resulted from his Paper, would be of great advantage to all concerned in dealing with the question, and he hoped that the working of the Act might prove to be for the general good of the community.

The Meeting then adjourned.

PAPER 314.
No. 490.

# VALUATIONS FOR MORTGAGE.

BY J. J. DONE (FELLOW).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, 11th December* 1905.

CHARLES BIDWELL (President) in the Chair.

The subject which I have the honour to introduce to your notice to-day is one that enters largely into the work of a surveyor. I should be inclined to think that more valuations are made for the purpose of mortgage than for any other, and the enormous building development of large towns, requiring as it does the outlay of large sums of money, would probably soon come to an end without the facilities for borrowing that are offered by banks, corporations, trustees, and private individuals.

But irrespective of building development, the thousand and one exigencies of our complex business life, occasionally assisted by the more foolish portion of mankind, who are engaged in the congenial occupation of dissipating their patrimony, require a never-ending stream of advances of money which can be raised most

easily, most cheaply, and most securely, by permanent or temporary mortgages.

There is here, therefore, a fine field for the special knowledge of the surveyor, who is required to make the valuation on which many, if not most, of such advances are made, and it is on the problems that arise from time to time in connection with these valuations that I now propose to address you, in the hope that discussion of the subject may enable us to determine or elucidate the general principles which apply to all valuations, whether for mortgage or otherwise.

My own career as a land agent began about the time of the agricultural collapse of 25 years ago, and I very well remember (and none of us who were in practice at that time are ever likely to forget) the catastrophic ruin that fell on those connected with the land, whether as landowners or farmers, or as mortgagees, many of whom became landowners greatly against their will. I remember a case in North Bedfordshire where £10,000 was advanced on an estate, and four other mortgages were effected on the top of that. For years that estate has been producing about £140 a year. Experiences like this, which were unfortunately common enough, naturally made trustees fight shy of that form of security, and money for many years drifted into other channels. But, by degrees, people have come to think that even the best gilt-edged securities have their drawbacks, and many who bought Consols at 112 and sold them at 88 have probably wished that their money had been placed in well-secured mortgages. At any rate, looking back at the last 25 years, my own experience has been that, on the whole, money placed out on mortgage has paid its owners as well, and has been as secure and as easy to get in when required, as any security that can be named.

When the enormous amount advanced on mortgage is considered, and when the remunerative rate of interest is taken into account, the occasional losses are negligible, and leave a wide margin to the credit of mortgages, and justify the returning popularity of this form of security. Nevertheless, the strain to which it was exposed at the time of which I am speaking left its mark in the way of legislation, and not a little litigation, the lessons of which are worth considering.

In the year 1893, an Act was passed which is known as "The Trustee Act, 1893." It is 56 & 57 Vict. cap. 53, and is a consolidating Act. The only section which concerns surveyors is the eighth, which is as follows:

"A Trustee lending money on the security of any "properties on which he can lawfully lend, shall not be "chargeable with breach of trust by reason only of the "proportion borne by the amount of the loan to the "value of the properties at the time when the loan was "made, provided that it appears to the Court that, in "making the loan, the Trustee was acting on a report "as to the value of the property made by a person "whom he reasonably believed to be an able practical "Surveyor or Valuer instructed and employed indepen-"dently of any Owner of the property, whether such "Surveyor or Valuer carried on business in the locality "where the property is situate, or elsewhere, and that "the amount of the loan does not exceed two equal "third parts of the value of the property, as stated in "the report, and that the loan was made under the "advice of the Surveyor or Valuer expressed in the "report."

In commenting upon the above section in *Hints to Young Valuers* (by A. R. Cragg and J. R. V. Marchant), the writer says:

"This enactment makes it necessary for trustees "who are intending to advance money on mortgage of "property to have the report of a valuer who is not "employed by the owner of the property; *the enact-* "*ment also imposes new and important responsibilities* "*upon the valuer who makes such a report for trustees.* "Besides reporting upon the value of the premises, he "must state in such report the amount he advises to be "lent by way of loan thereupon, and the loan is only to "be made under such advice, and the advice must be "expressed in the report. *It would, therefore, appear* "*that the valuer now incurs grave responsibilities in* "*the performance of such duties.* Formerly his duty "was generally merely to say what was the present "value of the property, and it was the solicitor's duty "to advise what proportion of such present value should "be advanced upon it as loan. The above-mentioned "enactment has, in case of mortgages by trustees, "transferred this duty, with the responsibility pertain- "ing to it, from the solicitor to the surveyor.

"It is unnecessary to point out that, under these "changed conditions, unusual care should be exercised "in the preparation both of the report and the valuation, "because the surveyor's liability is much greater than "heretofore, or than when he values for the purposes of "sale."

I confess I am not clear as to where this increase of liability comes in. A surveyor might advise a loan of more than two-thirds, but it is quite certain that no trustee would advance more in face of the express wording of the above section, and if he did, the liability would rest on his shoulders and not on the surveyor's.

One of the objects of this section was to regularise the positions of the numerous trustees who had ignored

an old rule of the Court of Chancery, that not more than two-thirds should be advanced by trustees on land, and not more than one-half on house property. A trustee having been held personally liable for a breach of this rule, which apparently had been allowed to fall into disuse in practice, the position of trustees generally became very serious, and the legislature, by the above clause, regularised their position and made it lawful to advance two-thirds on house property in spite of the decision referred to. That was the object of this section, and not the creation of any additional liability on the part of the surveyor. With that liability I now propose to deal.

I cannot do better than refer to volume v. of our *Professional Notes*, page 416, where there is a reprint of an article from the *Law Times* dealing with this matter. The conclusion of that article is as follows:

"The outcome of the cases which we have reviewed "(and they are all that there have been) may be sum- "marised in a few words. The mortgagee may be "either

"(A) a stranger to, or

"(B) a client of the valuer.

"If he is a stranger, his action against the valuer can "only succeed as an ordinary action of deceit, in which "he is now, thanks to *Derry* v. *Peek* in the House of "Lords, compelled to allege and prove fraud, fraud "being the essence of the action. If, on the other hand, "the mortgagee is a client of the valuer's—albeit the "valuer is to be paid by the mortgagor out of the money "advanced, or otherwise—if there is a contractual rela- "tion between the valuer and the proposed mortgagee, "and the valuer knows that he is valuing the property "in the interest of the proposed mortgagee, then all the

"mortgagee has to prove as plaintiff is that the valuer "did not use reasonable skill and care in preparing the "valuation. This proved, the valuer is liable for "damages. This non-proven, or disproved, he escapes. "But on *Cann* v. *Willson* standing alone, no one is now "safe in relying."

The same article says: "It is only three years ago "that valuers were for the first time held liable in "damages on their valuation in the case of *Cann* v. "*Willson*." (*Professional Notes*, vol. iii., p. 49.) In that case Mr. Justice Chitty, as he then was, adopted the words of Lord Hannen sitting in the Court of Appeal in *Derry* v. *Peek*, viz.: "I take the law to be that if a "man takes upon himself to assert a thing to be true, "which he does not know to be true, and has no reason- "able ground to believe to be true, in order to induce "another to act upon the assertion, who does so act and "is thereby damnified, the person so damnified is entitled "to maintain an action for deceit;" and, he continued, "I think they made this statement (the valuation) with- "out any reasonable ground for it, and that it was made "recklessly within the proposition I have stated (Lord "Hannen's). I have entirely passed by the question of "contract."

From the case of *Derry* v. *Peek*, however, it would appear the question of contract is of first importance. This case was as follows. A special Act incorporating a tramway company provided that the carriages might be moved by animal power, and (*with the consent of the Board of Trade*) by steam power. The company issued a prospectus stating that, by their special Act, the company had the right to use steam power instead of horses. The plaintiff took shares on the faith of this statement. The Board of Trade afterwards refused consent to the use of

steam power, and the company was wound up. The plaintiff having brought an action of deceit against the director, founded on false statement, it was held, reversing the decision of the Court of Appeal and restoring the decision of Mr. Justice Stirling, that the defendants were not liable; the statement having been made by them in the honest belief that it was true. The head note to the case (14 Appeal Cases, p. 337) is as follows: "In an action of deceit plaintiff must prove "actual fraud. Fraud is proved when it is shown that "a false representation has been made knowingly, or "without belief in its truth, or recklessly without caring "whether it be true or false. A false statement through "carelessness and without reasonable ground for "believing it to be true may be evidence of fraud, but "does not necessarily amount to fraud. Such a state- "ment, if made in the honest belief that it is true, is not "fraudulent, and does not render the person making it "liable to an action for deceit."

I would refer those interested in this phase of my question to the article quoted above, and I will sum up the matter in these words: that where a valuer is directly employed by the lender (which he may be, although paid by the borrower, and even in the first place instructed by the borrower) he must use reasonable care and skill, and, above all, act with a single eye to the interest of the lender; but that when his valuation is prepared without reference to any particular lender, and is used without his being brought into communication with the lender, it is necessary to prove actual fraud, as defined in *Derry* v. *Peek*.

I have stated that the valuer must act in the interest of the lender only. I have in my mind cases where valuers have been held liable for their valuations in

which it has been shown that the valuer employed was so employed by the borrower, acted in the interest of the borrower, and apparently regarded himself as the agent of the borrower. Probably nothing so warps and distorts a man's judgment as this pernicious practice of trying to serve two masters, and more than one valuer has had to pay dearly for it.

Having thus briefly dealt with the responsibility which a valuer has to face before he enters upon a valuation for a mortgage, let us now consider the general principles that apply to valuations made for mortgage purposes. To what extent, if at all, do the principles of valuing for a mortgage differ from any other valuation?

It is obvious, in the first place, that the position of a mortgagee differs from that of a purchaser. The latter takes the property for better or worse, but a mortgagee has no benefit from any increase in the value after lending his money; but, on the other hand, if the security greatly depreciates, he may be unable to realise even what he has lent. Everyone who buys and sells knows that from unforeseen causes, or defect of judgment, some things do better than others, and, in the general run of buying and selling, the unexpectedly good may be set off against the unexpectedly bad. That is an average that a mortgagee cannot strike. He has no "unexpectedly good," but he may have an "unexpectedly bad."

Again, a purchaser can nurse or improve the property, attend to its proper management, and exercise in many ways a fostering care; but a mortgagee cannot interfere with the management (except as afterwards mentioned) short of giving a notice to pay off, and, in the worst event taking the property into his own hands. Even

when he has done that he remains a mortgagee only, until such time as he has acquired a possessory title, and may be ousted at any time by the owner of the equity if the latter demands the property and is ready to pay up all interest and other proper expenses which the mortgagee has incurred.

It may, therefore, be some long time before a mortgagee has that security of tenure which is the essence of proper and thrifty management. He has, however, certain rights which go far to protect him In Fisher's *Law of Mortgage*, 5th edition, paragraph 674 *et seq.*, his position is thus defined:

"From the time of lending his money the mortgagee, "whether he be in or out of possession, acquires certain "rights, by virtue of which his title, such as it may be "and so far as it depends upon his possession of the "deeds or other indicia of title, is secured against "the interference of any adverse claimant, and the pro- "perty itself is preserved from deterioration in the "hands of the mortgagor or of any other person to "whose rights those of the mortgagee are superior "(paragraph 675). As regards the estate, the Court, at "the instance of an equitable mortgagee, will (on "sufficient ground being shown) restrain persons claim- "ing the legal estate under voluntary conveyance from "dealing with it.

"Moreover, the mortgagee may not only, at all "times, restrain such acts as the mining under buildings, "so as to endanger their stability, but if he shows the "security is insufficient (that is, it seems, that the "security being taken to be worth so much more than "the sum advanced, the act complained of will sub- "stantially impair the value which was the basis of "the original contract) he may, whether his security "be in fee or for a term, restrain acts which lessen

"its value. Such acts may consist of the removal "of valuable fixtures, or the cutting of timber, or even "the cutting of underwood at unseasonable times or "such as is of improper growth for cutting. But as "underwood is treated as the ordinary fruit of the land, "the cutting of it by the mortgagor, though insolvent, "and even though it be expressly included in the "security, will not be prevented if it be done at season-"able times and in a husbandlike manner, except, it "seems, when the mortgagor has been made a bankrupt "in which case it was prevented by Lord Eldon on the "ground that the mortgagee's right was to have the "estate left as it was at the date of the bankruptcy, "and to prove for the rest of the debt; though he after-"wards gave the reason that it was in the interval "between the bankruptcy and the appointment of "assignees when there was no one to exercise control "over the property."

Again, when he comes to realise, a mortgagee has not only to consider his principal money, but there are probably accumulations of interest, and there are the expenses of sale and conveyance and other legal expenses; and it is well to bear in mind that, as a very general rule, when a mortgagor gets into difficulties, he has bled the property for all it is worth before the crisis comes. Ought the valuer to take these circumstances into account? I submit not. With great deference, I submit that the valuer is called upon to value the property as it stands. He must take *rebus sic stantibus*, as Lord Chief Justice Coleridge said (in a case which I well remember, but which I have endeavoured without success to find reported) when he was discussing the duty of a valuer. The margin of one-third ought to be allowed for contingencies of this

kind; and if it were not that very often mortgagees allow interest to accumulate and expenses to run, and often do not bother themselves until matters get acute, I think it would be found that the one-third margin would be ample; at any rate, with few exceptions.

It is easy to suggest precautions of such a nature that it would be almost impossible for a mortgagee to lose his money, but I fancy that if valuers were to prepare their valuations on the basis of providing for any and every contingency, the amount of money that would be advanced on mortgage would rapidly become astonishingly small, and the many enterprises that depend on borrowing facilities, of which building development is perhaps the most conspicuous example, would be seriously retarded. In this connection, some remarks made in the hearing of *Godfrey* v. *Faulkner* may well be considered.

Mr. Hemming, Q.C., on behalf of the defendant, said: "The two-thirds rule is not adhered to by private "owners. The great lenders, such as insurance offices, "for example, always advance to more than two-thirds, "and the consequence is that no private lender can get "a good security unless he is prepared to do the same."

Vice-Chancellor Bacon said: "Prudent men in their "dealings must run risks. That may and must happen "in almost all human affairs. The two-thirds rule has "never been applied with mathematical exactness when "the amount has been exceeded by such a proportion as "£300 or £500 bears to the sum advanced in this case. "The test has always been, 'Is this what a prudent man "'of the world would have done with his own "'money?'"

With these pithy remarks I may well leave this part of my subject.

## The Valuation.

I now enter upon the purely technical part of my subject, in which the surveyor becomes the leading authority.

Having discussed the responsibilities which attach to the surveyor on his undertaking a valuation for mortgage purposes, and the lines on which he should proceed, we now arrive at the question, "What is "Value?" Is it the value of a property if brought to a forced sale?

Is the value of a property that which a willing buyer would give?

Is it what the surveyor, with his expert knowledge of property, generally considers to be its intrinsic and inherent value?

Is it the value of the property as a going concern in the hands of capable managers? Or is it on the other hand, the same property as a broken and bankrupt concern, practically derelict?

Or is the whole question to be relegated to a matter of supply and demand as the final authority?

Those who wish to pursue these speculations further may be referred to the remarks on valuation in *Matheson on Factories*, where the problems of factory value are dealt with in a most exhaustive manner. If I were to deal in the same way with all the different kinds of property, I should require the whole session for the purpose.

I take it that, when we make our valuations, we have first of all to consider, in Vice-Chancellor Bacon's words, what would a prudent man do in his own case? Looking at the property, whatever it may be, with the eye of an expert, seeing advantages and defects which the

ordinary buyer would not consider, we have to ask ourselves whether the property is a readily marketable one whether the market is likely to improve or the reverse, whether its intrinsic merits are of such a nature that, even if the market goes against it, patience and care will enable it to recover itself, or whether it is of such a nature that to become derelict means irretrievable ruin. In short, we have to look at every side, weigh contingencies and probabilities, giving to each its due proportion and perspective, and exercising the best judgment we can; remembering that in other things than war it is the unexpected that always happens. This perhaps, to some of our junior members, may not seem very helpful, but in the matter of a valuer's judgment nothing can take the place of experience, which is the best guide. But it may comfort them to remind them that young valuers and old valuers alike are subject to one universal infirmity: "We all make mistakes." Let me quote a passage from Scott and Morton's *Soil of the Farm:*

"'How did you fix it,' we once asked a valuer in a "large practice, 'when you began?' 'You just fired "'your shot in the dark and stood to your guns the best "'way you could, swearing you had hit the very bull's "'eye, whether you knew it or not. But you corrected "'your own practice yourself, though you would not "'allow the criticism of others; and as your experience "'gathered and you found what men would, could, and "'should give for what you had to offer them, you "'acquired the skill of fixing a proper value on the "'article without any conscious process of valuation "'whatever.'"

I remember reading, in the report of a compensation case, the cross-examination of a well-known valuer, who

is what the late President Kruger would have called "quarje." He was asked if, as a matter of fact, his inspection of the property (a somewhat important one) had not been confined to a five minutes' visit. To which the unabashed one replied, "Yes, but he could see more in five minutes than some people could in a lifetime." We are not all similarly gifted, but it is pretty certain that an opinion which, however long or short a time it has taken to form, is not based on a thorough, technical, studied (whether the study has been unconscious or not), and tried and tested knowledge of the property, is one that is too near guess work to be recommended or relied on. Let me illustrate my meaning by a case of the value of a house.

A valuer who can prepare the designs, write out the specification, and take out the quantities for a house, and who is constantly verifying his values by buying and selling, is obviously at an advantage as compared with one whose only knowledge of house property consists in buying and selling There are many details of construction, which the one will know how to appreciate or depreciate, but which the other may pass over.

But there is another side to this question. Again let me quote from *The Soil of the Farm:*

"A fair rent, on which the whole of the calculations "of a valuer for sale or purchase hinge, is very difficult "of definition. And in actual practice it is determined "not by any elaborate calculation, but by the judgment "of the tenant as to whether at the offered price per "annum he can make a living. The most elaborate "statement of the problem, how to value, that we have "ever seen, is to be found in a Blue Book, now many "years old, in which Sir Richard Griffith, whose staff "valued all Ireland thirty years ago, gave them his

" instructions upon the subject. We are there told very " properly that agricultural rent depends upon the price " of produce and the accessibility of markets; on the " composition of the soil, and on every item which " affects the cost of cultivating it; on the aspect of the " fields, their height above the sea, the nearness of the " seaweed for manure, and twenty other things. Wheat, " oats, and barley were then put at about 5*s.*, 2*s.*, and 3*s.* " respectively per bushel; butter at 7*d.* per lb.; beef and " mutton at 3½*d.* and 4½*d.* respectively. The nature of " the soil whose value had to be determined was the " subject of forty separate paragraphs, and the cost of " its cultivation under various conditions as to cropping " is set forth in great detail. The amount of the " produce to be expected from each crop, the labour ex- " penditure on each, the effect of situation and of local " circumstances—all these are discussed.

" If the land is of a certain value at the seashore, you " must deduct 10 per cent. if it is 50 feet higher, 25 per " cent. if it is 800 feet above the sea. Bad fences and " bad roads must be taken into consideration. There is " a table showing that when the steepness of a road is " 1 foot in 80 the cost of carriage is the same for 1 mile " as it is for 1¼ mile on the level. If the slope is 1 foot " in 10, 1 mile is as good as 3 on the level. This is in " relation to the advantage of being near the shore, " where a supply of seaweed is to be obtained. If the " shore is 1¼ mile off, and the supply is 'middling,' 12½ " per cent. is to be added to the rent; if 2 miles off, and " the supply is 'plentiful,' 15 per cent. is to be added; " and a table prescribes the additions for 'scanty, " 'middling,' and 'plentiful,' supply at 1, 1½, 2, 2½, 3, 3½ " miles' distance; each of these having to be considered " in relation to the 1 in 10, 1 in 20, 1 in 30, &c., steep-

"ness of the road. The increase of value due to the "neighbourhood of towns is the subject of another table; "and each line of it names the population of the town "and each column of it the price to be added at the "varying distance. If half a mile from 1,000 people, 10 "per cent. is to be added to the value; if 4, 5, 6, 7, 8, "9, 10 miles from a town of 100,000 people, 100, 90 "75, 50, 30, 15, 10 per cent. are to be claimed as "additional rent.

"Does any one suppose that any valuer on the face "of the earth ever went through such calculations as "these, except as a matter of curiosity?"

Does any one indeed suppose so? Not, I fancy, any Member of this Institution. When I was a young man trying to ascertain the principles of valuation, I often observed the methods of men contemplating the renting of a farm, and endeavoured to find out by what process the rent offered was arrived at. As a general rule it is no caricature of the most popular way to say that it consists in walking round the farm, then looking over the hedges, and finding what the neighbours were giving, and getting in as much below that as your powers of bargaining can effect.

And may it not be said in defence of this method that it is just as likely to be right as any calculation based upon a hypothetical consideration of what the farm would grow in any one year and deducting the cost of growing it?

How far my experience coincides with that of other Members of this Institution, discussion will, I hope, reveal.

In settling the rent of land, I have often been perplexed by the following difficulty. In one district, land of a certain fertility will be making considerably less

than similar land in other parts of the country; *e.g.* land that in one place makes, say, £1 per acre would, in another district, make 50 per cent. more; the chief difference very often being that, in one case, the farmers are industrious, simple, and frugal, and in the other, standards of living have been adopted which, at the present time, are unjustified.

Having ascertained the rent of land, the next question is that of outgoings. Such as consist of rates, taxes, and permanent charges are comparatively easy to arrive at, but the item of repairs is one that requires some consideration. It is impossible to place these at any hard-and-fast percentage. From 10 to 15 per cent. is often given as a fair proportion, but I do not think these figures anything like represent the limits. On looking at the accounts of various estates for the year 1903, the proportion that repairs bear to the gross rental is as follows:

| | |
|---|---|
| A Bedfordshire Estate - - | 30 per cent. |
| A Buckinghamshire Estate - | 27½ ,, |
| A Kent and Sussex Estate - | 12½ ,, |
| A Leicestershire Estate - - | 2 ,, |
| A Middlesex Estate - - | 9 ,, |
| A Northamptonshire Estate - | 11 ,, |
| An Oxfordshire Estate - - | 35 ,, |
| A Shropshire Estate - - | 10 ,, |
| A Wiltshire Estate - - | 15 ,, |

It must not be understood that these figures are, in all cases, normal and ordinary. Numerous changes in tenancy greatly affect the bill for repairs; but, when all allowances are made, there is a vast difference in the cost of upkeep. In some cases, *e.g.* large grazing farms, the buildings are few; and perhaps 5 per cent. would be a reasonable allowance. In other cases, such, for

example, as estates largely comprising small holdings and numerous cottages, 20 to 25 per cent. may easily be spent in repairs. In other cases, such as Middlesex farms, the tenants largely undertake the burden of repairs, and so on. Moreover, the custom of estates varies greatly in this respect. The owners of the estate in Bucks, referred to above, undertake the whole cost of repairs, except internal repairs of a decorative nature. On the Wiltshire estate, the owner finds materials and half labour; and nearly every estate differs more or less from the others. The repairs bill is, of course, immensely affected by the character of the buildings. On estates where the buildings are modern and substantial, the repairs bill is naturally very greatly reduced in comparison with others where the buildings are old, and were originally of temporary construction. It is sufficient to say that this important item must be well considered and allowance made accordingly.

Having ascertained the actual net rental, the question is, what multiplier should be used? Text books often lay down the rule (and this was formerly much more the case than it is now) that the years' purchase of land should bear some more or less intimate relation to the price of Consols, and possibly in the last resort Consols may react on land. It is not very easy, however, in recent years to trace much sympathy between the two. More's the pity; for when $2\frac{1}{2}$ per cent. Consols stood at 112, land ought to have made over 40 years' purchase. As a matter of fact, plenty of land has been bought and sold in recent years to pay about 4 per cent. net, on existing largely reduced rentals, and if the price of land is arrived at by ascertaining the net rental, the multiplier in the case of mortgages should not, I venture to think exceed 28 years' purchase, in any case.

If the figures so arrived at are compared with the prices which similar land has made in the neighbourhood, the chances of error are reduced pretty nearly as far as the fallibility of human judgment will allow. Those of us who are members of the Estate Exchange can derive much valuable information in this respect by searching the files there; and to those who are not, the Year Book of Auction Sales, published at the *Estates Gazette* offices, contains much of that valuable information in a very compact form. It is, however, curious to note how much more numerous sales of land are in some neighbourhoods than in others. For example, compare East Kent with such counties as Beds, Bucks, Northants, Hunts, &c., &c. Land is, of course, pre-eminently the trustee's security, especially now that, after the tempest of 25 years ago has subsided, things have pretty well found their level and we have all of us become used to more modest lines. But there is one item in the valuation of land that must be regarded as more or less of a speculative character—that is, the mansion and park. These are often difficult to let or to sell. Wealthy men who fancy a place will often pay handsomely for their fancy, but those who have mansions to let often have to wait a long time before they succeed. It is, therefore, desirable to put a very moderate value on anything of this kind.

As regards woods and plantations, it is probably sound to value them on a purely revenue basis, and in that respect it is important to make a note of the system of management employed, whether good, bad, or indifferent. A mortgagee, as already stated, can protect himself against a wasteful removal of the timber from an estate.

Before leaving this part of the subject, let me emphasise the immense advantage of local knowledge.

London surveyors owe much in this respect to the courtesy of their country brethren, whom I have always found very accessible and ready to give information.

Rent, or rather revenue, is, no doubt, in the case of land, the main factor on which to build a calculation, but in the case of London warehouse property, if that were taken without qualification, it would sometimes lead to rather incongruous results.

Some years ago I had to report, for mortgage purposes, on two warehouses in the City of London. They were held on lease at a moderate, but market-price, ground rent. On measuring them up, I found them to have cost about £1,000 each. One was so well let that it was yielding a net income of £200 a year; the other, precisely similar, was only yielding between £70 and £80 per annum. I compromised by allowing something on the cost price for the fact that they were well let, but my valuation gave great offence to the proposed borrower, who indignantly declined to accept it, in view of the lettings.

In the case of many City properties the ground rents are so high as to be practically a mortgage in themselves. These properties should be treated with caution. To say the least of it, they are not trustees' securities.

An enormous amount of money is advanced every year on suburban house property. It is not perhaps wise to hazard such a generalisation, but I strongly suspect that the majority, perhaps the large majority, of suburban houses have a mortgage on them, or, to use a picturesque expression I once heard in the Midlands, "some one sitting on the roof-tree." One hears occasionally of securities of this kind going wrong; but, when the enormous amount of money so advanced and the remunerative rate of interest are considered, this class

of security would, I venture to think, bear comparison with any. One of the principal dangers in this class of security is that, at the time of a boom, such as that about 1898 to 1902, the price goes up to a point which is more or less fictitious, and when the ebb takes place, the too sanguine valuer is apt to be left high and dry. In this class of security I confess to a prejudice in favour of property on a good, well-managed leasehold estate. I am inclined to think there is no security with which greater liberties have been taken than suburban house property, and it speaks volumes for its essential soundness that so little mischief has resulted. It requires very ordinary skill in valuing, and presents few, if any, problems. But, here again, rent must not always be regarded as an entirely reliable basis. We all know the builder, who, in order to get as much on mortgage as he can, puts a higher rent in his tenant's agreement than he actually receives.

Houses beyond the limits of the suburbs are not so easy to deal with. There, any estimate of first cost is liable to be a fallacious guide to value. It is easy to spend a thousand pounds, or any other sum, on a house in some pleasant country place; but what the value will be when it is built is a widely different question. Isolated properties of this kind, even when accessible to a man engaged in business in some not far distant town, are liable to great vicissitudes. They will sometimes stand empty for months, or even years, and, generally speaking, a tenant has to be attracted by a low rent. Many a house that cost £2,000 to build is worth in the market one-half that sum when finished.

Securities, the value of which is arrived at by the use of tables, have to be treated cautiously. This applies to very short leaseholds, life interests, reversions, &c.,

which are very frequently used for raising money on. Perhaps the insurance companies are the best people for loans of this kind. Tabular values, as a rule, are based upon a portion of the income being set aside to accumulate each year at interest in order to reinstate the capital. This, however, involves the investment of sums which when extremely small would sometimes be most difficult to invest. They are, therefore, securities that appeal to a very limited class, and their value at the mart is correspondingly low. This applies particularly to profit rentals, which, as mortgage securities, are quite outside the consideration of trustees, and are fit only for a very small class of private lenders.

Another very speculative class of security is public-house and hotel property; but this is ground which I dare not tread. The rule for finding the rental value is fairly straightforward in principle, if not perhaps so much so in application, but what the relation between the rental and sale value is, and how it is arrived at, is a mystery to an ordinary land agent like myself. In the case of the *Law Guarantee and Trust Society* v. *Bailee* (*Estates Gazette*, March 24th, 1900) public-house valuers stated in evidence that a house doing £450 a month was worth £750 a year, and that £750 a year was worth 35 years' purchase, in addition to goodwill valued at £200 a year, and also valued at 35 years' purchase; together making a capital value of £33,250. As, however, the society lent £25,000 on mortgage and lost £9,000 by the same transaction, we must assume that the valuer was unduly sanguine. Perhaps our discussion may throw some light on this mystery.

When we leave what may be called the standard securities referred to above, the problems that offer themselves are endless. The difficulties that are likely

to arise from lending money on brickworks are illustrated in the case of *Whiteley* v. *Learoyd*, 32 Ch. Div. 196, *Professional Notes*, i., *p.* 326). This case went to the House of Lords, but it was a case of trustee's not valuer's liability, the latter being only an incident in the case.

Briefly, the facts were that a firm of brickmakers entered into partnership, and for this purpose a valuation of the property was made, amounting to £6,000. They spent a considerable sum beyond that in buildings, machinery, &c. The property consisted of 10 acres about a mile from Pontefract, one and a half acres being occupied by buildings, kilns, &c. The bank advanced £4,200 before the mortgage was effected. The valuer who made the valuation for the mortgage had, a year previously, valued the property, for some other purpose, at £7,200, *i.e.* £2,000 for the land and £5,200 for the buildings and machinery on it. This was a going concern. When instructed to value for a mortgage, he reported, amongst other things: "We are aware there "should be a large margin in brickworks, as the material "is being constantly worked out; but having carefully "considered this, we think the land, premises, and free-"hold fixtures form a good security for £3,500."

He was asked in cross-examination what difference he would make between a valuation for mortgage and a valuation as a going concern, and he replied: "I should say 10 per cent. would represent the "difference not as a going concern." Lord Watson observed, "The answer is by no means satisfactory." Trade became bad, the brickmakers failed, the agricultural value of the land was practically destroyed by the brickmaking operations, and the land, from its situation, &c., was unsuitable for building.

The point at issue was whether this was a security which trustees were justified in lending money on; and the answer, with which most surveyors will probably agree, was given by the Court of Chancery, the Court of Appeal, and the House of Lords, that trustees were *not* so justified.

In the case of *Harding* v. *Ewing* (*Estates Gazette*, 18th May, 1901) the danger of building up a valuation on rentals, more or less fictitious, is exemplified. The facts are set out in the following judgment of Mr. Justice Bruce:

"His Lordship, in giving judgment, said it was "difficult to see upon what principle the defendant's "valuation was based, because, on the face of his "valuation, there was nothing to show how he arrived "at his figures. He was not able to produce any sub-"stantial notes, made at the time, upon which the "valuation was based. He acted upon the information "supplied by Allday, who gave him the rentals as "follows: Nos. 1 and 2, £32 each, No. 5, £40, and No. 7, "£45, making a total rental of £149. This defendant "multiplied by 20, which gave £2,980. He then "deducted the chief rents and another item, which left "£2,100, the amount of his valuation. The first "question was whether defendant was justified in "arriving at his value. He thought not. He had "come to the conclusion that the defendant had not "exercised ordinary care and diligence in order to "ascertain the actual rental, or he would have found "that the rental was excessive. The rentals of £24 for "two of the houses and £26 and £28 for the remaining, "making £102 in all, he was satisfied represented the "highest rental to be obtained for the property. Defend-"ant contended that he was justified in adopting the

"rentals given by Allday, because plaintiff referred him "to Allday for particulars. He (his Lordship) could not "accept the suggestion that he was entitled to value as "he had done. On this basis of rental, after deducting "the chief rents, there remained £1,228, instead of "£2,164, as given by the defendant, and this was good "security for £800. His Lordship did not think "defendant was justified in multiplying by 20, without "making any allowances. It was not reasonable to "suppose that the property would always remain at its "full rental value without making allowances for repairs. "The defendant had no grounds for putting the property "at £2,100. Defendant had urged that the property "had fallen in value since he had valued it. But he "was not satisfied that that was established. Houses "had been built in the neighbourhood, but he did not "think they had deteriorated from the value of the "property. *As a valuer, the defendant was bound to "consider the principle of property maintaining its "value.*"

*Bryant and Reed* v. *Langford and Newling* (*Estates Gazette*, 5th August, 1899) is interesting on account of a contention put forward by the plaintiffs, who sought to make the defendants liable for loss on an advance made on the strength of the defendants' valuation. This contention was, in the words of the report, "that "the defendants ought to have adopted, in the case of "speculative property, the London and Manchester "system, by which the value of a chief rent or long lease "rent is deducted, not from the gross value of the pro-"perty, but from the two-thirds lending amount, which "would have given a wider margin of safety. His "Lordship, Mr. Justice Bigham, pointed out that a "mistake was not negligence, and that valuers were not

" insurers; nor was the adoption of one method rather " than another necessarily negligence."

As far as my experience goes, the alleged system is non-existent, at any rate as regards London, but perhaps others may know more about it. The jury found for the defendants.

The facts in *Lawson* v. *Toplis and Roberts* (*Estates Gazette*, 5th November, 1898) appear to have been as follows. The property (a shop and dwelling-house) was valued before completion, and the valuer based his estimate on an anticipated rental of £90 per annum, subject to a ground rent of £20 per annum. When complete, however, the property failed to let, and there was a conflict of evidence as to the reasonableness or otherwise of the valuation. Mr. Justice Channell is reported to have said: " On the question of advance, " the gross amount dealt with should not be the highest " amount they could expect if a willing purchaser could " be got to give the price, but it meant the price which " could reasonably be got at the moment, on which " a mortgagee might reasonably advance two-thirds." This is Lord Chief Justice Coleridge's principle of *rebus sic stantibus* already referred to.

The case of the *Law Guarantee and Trust Society* v. *Boyes* is of importance in more ways than one. This is another case in which the society attempted (this time unsuccessfully) to hold a valuer liable for a loss they had incurred. The property itself was of such a nature that it was not easy to arrive at a letting value which could be relied upon. It comprised the Bromley and County Club, the Grand Hall, Swimming Baths, and a shop and dwelling-house. It being impossible to drain into the sewer by gravitation, pumping was necessary, and the pumping arrangements proved to be

unsatisfactory. The lettings, according to the particulars furnished to the valuer, were, apparently, to reliable people, except that the rent of the baths was an estimated one, and this the valuer considerably reduced. He capitalised these rentals at 20 years' purchase, and a number of surveyors of standing supported this. The proprietor became bankrupt, the tenant of the hall terminated his lease, the property got into low water, and, as too often happens in such cases, it failed to hold its value. Apparently, the moral is that a most conservative estimate of this class of property should always be made.

I must trespass on your patience no longer. I am conscious that I have only touched the fringe of the subject; but if the points dealt with in my Paper are fortunate enough to serve as pegs on which some of the "old hands" of The Institution can hang a few of the treasures of their experience in the subtle art of valuing, my maiden effort may be the humble means of furnishing light to many a perplexed young valuer, which will be the highest recompense I would desire for any trouble the preparation of this Paper may have entailed.

Mr. F. G. CHINNOCK (Fellow) said it gave him great pleasure to propose a hearty vote of thanks to Mr. Done for his most excellent Paper, which was, he was sure, of the greatest interest to all surveyors and valuers whose business called them to make valuations for mortgage purposes.

He did not propose to enter at length into the details which Mr. Done so minutely dealt with, for to do so would be impossible in the time then available; but he would express his entire concurrence with the author's remark that even Members of The Institution all occasion-

ally made mistakes. He did not believe in the infallibility of any man—not even of the Pope—but he was sure that the man who made the fewest mistakes, especially when valuing for mortgage purposes, was the man with the widest experience in that particular branch of his profession. The nature of the surveyor's work was, as Mr. Done remarked, so wide, and the circumstances in which he was called upon to give a decision were so various that the only basis on which he could safely found his advice to his clients was his practical knowledge and experience, always remembering that he must deal as carefully with the interests of all parties as with those of the man by whom he was actually employed.

It was certainly a consolation for surveyors to remember that there were few other professions where no mistakes were made; even medical men could not help sometimes making mistakes, and the best of our soldiers and sailors had occasionally to admit an error of judgment, but the best man was he who made the fewest; and, with this in view, surveyors must exercise prudence and turn their practical experience to account, especially safeguarding the interests of the mortgagee in making valuations, and letting nothing influence them in coming to what they honestly thought to be a sound decision.

Mr. J. H. SABIN (Professional Associate of Council) said he had great pleasure in seconding the vote of thanks which Mr. Chinnock had proposed.

In view of the fact that the afternoon meetings, of which this was one, were instituted principally for the benefit of the country Members, it would, he felt, be hardly fair for a town member like himself to occupy

much of the time of the Meeting, but he would venture to remark on one or two points in the Paper which struck him as of particular significance.

There could, he thought, be no difference in the actual principle of valuation, whether a surveyor had to advise a client who was selling property or one who was purchasing for any purpose whatever, or whether the client was going to lend or to borrow money on it. In all such cases the valuer's reputation was at stake, though it was possible that in the one case his pocket might be affected and not in the other. He could hardly imagine it possible, however, that any surveyor worthy of the name would be influenced by the latter consideration, when the value of his reputation and the monetary result were in the balance.

In his judgment, no particulars, however minute, could or should be overlooked in making a valuation, for some little, apparently trifling, point might often affect the value of property and become an important factor in determining its desirability as a security. It was not, he believed, altogether inadvisable sometimes to warn the borrower that he might be asking too much, as well as to warn the lender that he might be lending too much. It was sometimes a kindness to tell a man that he had over-estimated the value of his property.

Mr. J. L. CROUCH (Fellow) said that, as he could not claim to be a Member of The Institution carrying on business in the provinces, he would take the last speaker's hint to make as brief as possible the few remarks it occurred to him to offer on Mr. Done's excellent Paper.

The propriety of valuing as on behalf of the mortgagee had been emphasised, and he thought that, when properties, such as factories, brickfields, and the

like came to be considered, it should especially be remembered that the true value was what the property would be worth to the mortgagee and not what it was at present worth to the mortgagor. A property might possess a certain value to the mortgagor as a going concern, but if the mortgagee had to deal with it himself it might become a different thing altogether. In such cases his own experience had been that factories and similar properties were often, for mortgage purposes, worth very little more than site value, when the value of the goodwill and personal management were thrown out of calculation.

Other classes of securities which valuers had occasionally to deal with had been referred to by Mr. Done: for instance, reversions and life interests. It was true that, to some extent, both these classes of security were more suitable for insurance companies' business than for private capitalists. He thought the explanation for this was not difficult to discover. Reversions, when purchased, must be regarded as investments in which one stored up interest because one would not get the capital and interest until the reversion fell in; but mortgaging a reversion was not quite the same thing. In that case one relied upon the interest being paid by the borrower. Should it not be paid, then the lender had a power of sale under the mortgage deed, and so could realise his money.

Reversions were, no doubt, very good investments indeed for an ordinary capitalist; but one point must be borne in mind: in the case of a reversion to freehold property, it often happened that the life tenant was without impeachment for waste, and in that event the reversioner, or mortgagee, or owner of the reversion had no power to compel the life tenant to keep the property

up. In that case a mortgagee might ultimately come into possession of the property in an absolute state of ruin. That must be carefully considered by the valuer in all cases of mortgage of reversions. The same argument did not quite apply to leasehold properties, for with them the freeholder could always come down on the leaseholder to compel him to keep the property in repair. Thus, in the case of a reversion to leasehold property, a lender did not run quite the same risk of losing his money as in the case of freehold property.

The same sort of argument applied to life interests. The difficulty in lending money on a life interest was that one insured the life of the life tenant and paid the premiums out of the interest received from the trustees; if, however, the life tenant were to go away, and one could not produce him, the trustees would not pay the interest, and if one could not prove his death, the insurance company would not pay the policy money. The question then was how to pay the premiums when there was no interest to pay them out of. That did not quite apply to insurance companies, with whom it was a mere matter of book-keeping.

Those were matters which must certainly be taken into consideration in valuing life interests for mortgage purposes, but the difficulty might, he thought, be easily overcome. Suppose the life-interest were £100 per annum, and a valuer were asked what amount should be advanced on it, he would calculate what there would be to receive, after the deduction for insurance premiums, and so on. If one could claim to be entitled to the whole income, the life-tenant had no interest in proving himself to be alive. The best course in such a case was to pay him something periodically, say £20 a year. Then, every

time he had to show himself alive in order to receive the allowance, it would be easy for the lender to prove his existence when asking for his interest from the trustees.

The question of surveyors' liability had been referred to. He thought the profession was to be highly congratulated that surveyors did not incur greater liabilities than they actually did, in view of the risks involved in advising their clients.

When Mr. Done asked "What was value?" he certainly opened up a large subject—too large to deal with on the present occasion—but he observed that, though the author propounded a little catechism as to what constituted value he did not give the answers to his questions. When Mr. Done asked: "Is the whole "question to be relegated to a matter of supply and "demand as the final authority?" he would unhesitatingly answer, "Yes," for he saw no other way out of it.

Then again the question, "Is it what the surveyor, "with his expert knowledge of property, generally con-"siders to be its intrinsic and inherent value?" was left unanswered. He (Mr. Crouch) thought there was no such thing as value inhering in land—everything depended on supply and demand, and what applied to land applied to all other commodities. It would be difficult to imagine an Esquimaux parting with a single slice of blubber for the best ice machine ever made, but the Esquimaux's wife might highly prize a hot-water bottle which would be almost valueless in Bombay.

Reference had been made to the liabilities of surveyors; but it must not be forgotten that they had also some rights. They had, for instance, the right to charge for their opinion, and on this point he should be glad to

have some enlightenment. It was a common thing to receive instructions for a survey for mortgage purposes accompanied by the questions, "What will your fee be "if the mortgage goes through, and what in the event "of its going off?" In his humble judgment no trustee should accept any valuation paid for in that way, for the valuer would then be an interested party. But, as against that, another question arose: should a mortgagor be called upon to pay as much for a survey if the mortgage went off as he would if it went through? He had said before in that room that in his own practice he had adopted the method of quoting a fee, and if, on survey, it were found that the property would not be good enough for a mortgage, he charged one-third of the fee for the survey only. Should the matter go through, he charged the full fee for his survey, report, and valuation.

In the first case he did only one-third of the work and expected only one-third of the fee, and under such an arrangement it could not be said that the fee depended on the opinion.

Mr. W. E. HORNE (Fellow) said he was sure he had the Meeting with him when he expressed his gratitude to Mr. Done for having written and read his most interesting Paper. The last speaker had referred to the question of fees, and had, it seemed to him, brought the question of what should be charged for a survey when the mortgage was not carried out, to a rather fine point. Personally, he had come to the same conclusion that he thought a great many surveyors had done, and when a mortgage was not carried out he had charged a third of what the full fee would have been. The point he had always in mind was that he was not paid for his time, but for his experience and responsibility, and if, by

reason of the business not being carried through, he was relieved of responsibility, he should not charge for what he was not called upon to undertake. He thought it would be a pity if it were supposed that surveyors would be influenced in advising a client by the amount of the prospective fee. If a client once thought for a moment that the surveyor he employed had that in view, it was very certain that he would entrust his interests to some one else.

Surveys such as those referred to, were, without doubt, made primarily to protect mortgagees. It did not matter who paid the fee, but the surveyor made his report for the mortgagee, and it was the mortgagee who had the right to do what he liked with that report. If he chose to show it to the man who borrowed the money, he was at liberty, he thought, to do so. Theoretically, the mortgagee paid the fee, and if he liked to get it from the mortgagor that was his business; but it was not for the surveyor to be in touch with the mortgagor on the question of fees or to make any arrangement with him whatever.

The question had been raised how far the surveyor ought to verify the rents. He thought it was not his business at all. If, in his report, he stated that he was informed the rents were so much, and under such and such leases, it was then the business of the solicitor to examine the leases and to see they were in proper order and in accordance with the report. A surveyor who tried to do this might attempt something which he was not competent to decide, and so possibly lead the mortgagee into a very difficult position. It was impossible, on a large estate, that the surveyor should examine all the leases, and be able to tell whether they were in proper order. For that he must very often rely on what

he was told by the mortgagor or his solicitor; but if he carefully set them out as a basis of his report, it would be easy for the mortgagee's solicitor to verify their accuracy.

As a London surveyor, he was afraid he could not speak with much knowledge on the valuation of landed estates. He confessed that he had never made a field-to-field valuation in his life, and he feared that if he did his client might have ground for complaint. In such matters he had generally been content to find out what the income of the estate had been. One could see the estate books for past years, ascertain the histories of the tenants and the length of time they had held their farms, and examine accounts of outgoings and repairs done on the estate. One could then walk over the farms and see the state of cultivation, and whether the tenants generally knew what they were about, and were in prosperous circumstances and contented with the terms of their tenure. It was on these things, he thought, that one was able to form a fair opinion of the real value of an estate as a security for mortgage.

A previous speaker had referred to life interests and the difficulties which arose when the mortgagor went away and one was not able to prove his existence. In that connection he might mention that he had occasion lately to come across a very curious case, where the proposed mortgagor only held the estate so long as he kept the name of, say, "Jones." There was absolutely nothing in the world to make him keep the name, but if he changed it to, say, "Smith" or "Brown" he would lose the estates. It was not easy to see, in such an event, that there would be any security remaining for the mortgage, and how best to get a proper title, which would be reasonably security for the money lent, was an interesting problem.

Mr. E. W. RUSHWORTH (Fellow) said that, while he agreed with previous speakers that, in making valuations for mortgages, the valuer must look first to the interests of the mortgagee, he was bound to say that complaints had often been made by mortgagors, when paying their fees for valuations, that the valuer had entirely ignored the fact that he owed some duty also to them and had, in order to make his own position quite secure, put the value of the property below what it really was. No doubt, however, the greater danger was that the valuer should over-estimate the worth of the security.

When considering the matter of real value, one was faced by the questions which Mr. Done had put so forcibly in his Paper, but to which he thought he had given no clear answer. There were often two values for the same property. Take, for instance, the not unusual case of a tradesman starting with one shop in a main street, and, as his business improved, buying the adjoining premises one after another, having naturally to pay immensely more than the ordinary price of houses in that street, because he wished to attach them to his own and had to buy other people out. In such a case, if the man died and a valuation were to be made between his estate and the surviving partners, it was obviously unfair to take the value of that property at what it might be if it were suddenly thrown into the market; but if the firm had obtained a loan on mortgage of the property, that was the position in which the mortgagee would be placed if the firm failed. He would then find himself obliged to put the whole of the property into the market at once with vacant possession.

If therefore a valuer were asked whose interests he should consider when valuing such a property for mortgage, surely he ought to consider what the man who was going to lend the money would expect him to look

at. Was he to base his valuation on what the property was worth to the flourishing firm, or on what it would be worth to the mortgagee if he had to realise the security? He believed that, in ninety-nine cases out of a hundred, the man who was going to run the risk of lending his money would expect the valuer, in making his report, to tell him what he considered he would be likely to get if he did not receive his interest and had to take steps to realise.

That was the view he invariably took in such cases, and, indeed, he thought valuers would get into considerable difficulties with their clients if they adopted any other.

He considered that it would not be fair to charge always the full fee for a valuation, whether the mortgage went through or not. Everyone knew that borrowers could often get from their bankers advances up to the ordinary margin of safety without any expert valuation at all. Consequently, in the majority of instances, it was the difficult cases that were brought to surveyors, where the proposed margin was too small and a careful surveyor would not be able to recommend the advance. In such circumstances the borrower would have most likely to go from office to office, and it would be very hard on him if, on each occasion, he had to pay the full fee. A competent valuer charged a proper fee for a mortgage valuation because it involved great responsibility, and if the mortgage fell through, clearly he had not that responsibility, and ought therefore to be satisfied with less remuneration.

Mr. W. Edward Woolley (Fellow) said he hoped no London Member who might be coming down into Leicestershire to make valuations would take, as applying generally to the county, the figures given by Mr. Done as the usual percentage for outgoings on a Leicestershire

estate. He mentioned this for his own justification, for if the idea became general that the expenses on property in Leicestershire should be only 2 per cent. on the gross rental, it would be rather bad for the reputation of his firm. He was sorry to say that the accounts of several estates which they had the honour of managing showed very considerably more than Mr. Done's figure. He was, nevertheless, pleased to hear there was even one estate which got off so cheaply.

It had often struck him, in connection with this matter, that a great deal of trouble and ultimate expense might be saved if mortgagees, when lending money, stipulated that at certain periods inspections should be made of the properties, for which the mortgagors should pay. In any case he thought a mortgagee was wise to have the state of his security looked into occasionally. He knew of instances where inspection of this kind would have saved a vast deal of trouble and great loss of money. It might be done for a moderate fee, and it would be a great relief to trustees to know that the properties were being properly looked after. He did not see why a man who advanced money on property should not look after the management of it to a certain extent, as well as the man who borrowed the money. Investors looked at the stock and share lists from time to time to see whether stocks were going up or down, so that they might have warning to get rid of a doubtful security, and if a man found that property on which he held a mortgage was being allowed to deteriorate, he would, if he were wise, take steps to secure himself from loss.

With regard to the valuation of house property, he did not quite understand why, as Mr. Done said, a valuer who could draw a specification, and who knew all about the ins and outs of a building, was more specially qualified to judge of its value as a security, than the

man who simply based his judgment on the occupation and the rent. He would counsel young surveyors not to have anything to do in such cases with calculations as to the cost of a house, which was very misleading as a basis of valuation for mortgage.

In a northern town he had recently been shown a house which he was told cost £8,000, but which the owner would now be glad to let for £150, and which, if put into the market, would make more than £3,000.

A man might be able to draw a specification, and know the value of the brickwork, and the slating, and the plastering, and everything about the house, but if he made that knowledge the basis of his calculation of value for mortgage he was certain to get into difficulties, A valuer must ascertain the rent and what was the demand for property in the neighbourhood, being also careful to find out something about the rates, for these had a good deal to do with the letting value of property.

The PRESIDENT said he was sure the Meeting would agree with him that a hearty vote of thanks was due to Mr. Done for his Paper. On one fact he thought surveyors might congratulate themselves: if, when called in to make a mortgagee's valuation, they did what they believed to be faithfully and clearly their duty, and carefully considered every fact concerning the property they had to value, they could not be called to account by any court of law. It was only in respect of rash valuations that such a thing would be likely to happen, and, as one speaker had said, surveyors might congratulate themselves that the cases of unsatisfactory valuations which came before the Courts were very few indeed. The valuer must always bear in mind, he thought, that the mortgagee was the person whose interests he was representing, and must be most careful, if he were brought in touch with the mortgagor, not to be led

away by any information or possible exaggeration as to the value of the property to be dealt with.

In going over a landed estate for valuation, there was much detail to be considered as well as the mere present rental value. One must base the calculations on rental value to some extent, but a point on which a valuer should be most careful was the question of repairs. He knew of estates which, at one time, he had found in good order, but which eight or ten years after proved to have become much depreciated in value owing to lack of proper repairs. Some of these points were very fully dealt with in Mr. Done's Paper, which he was sure would form a valuable addition to the *Transactions*, and prove most useful for reference in cases where a Member was called upon to undertake the work of valuation for mortgage.

The vote of thanks having been put to the meeting was carried unanimously,

Mr. DONE, in reply, said he wished to thank the previous speakers for their very kind expressions of appreciation of his Paper, and the Members for the heartiness with which they had passed the vote of thanks. As he had said, if he could think he had, in any way, assisted in the slightest degree those younger Members who had the work of their profession before them, he should consider he had gained the highest recompense he was entitled to. There was nothing in which he felt more sympathy with the younger Members of the profession than on the question of valuing. When they came into practice they had very often to take on themselves serious responsibilities, and he himself well remembered how, time after time, he had been puzzled by some of the questions brought forward during the discussion.

He was glad to find that Mr. Crouch had dotted his

i's and crossed his t's with regard to the question of lending on reversions and securities of that kind. He thought it would be generally agreed that such matters were much better transacted by insurance companies, who had special machinery for dealing with the calculations involved in cases of depreciation and apportionment, which gave them an advantage over ordinary lenders.

He was sorry to hear some complaints that he had not answered his own questions. He admitted that he had not done so, except in the most general way, and his reason for not answering them was that he did not think it was possible to give any clear or definite answer; but it would be observed that on page 78 of the Paper, he said "Looking at the property, whatever "it may be, with the eye of an expert, seeing the advan- "tages and defects which the ordinary buyer would not "consider,"—and so on, the valuer had to ask himself certain questions before he could arrive at a just estimate of the value of the security. One must look at the property from every point, and must apply that test which he ventured to think was the crux of the whole question—what would a prudent man do if the money were his own? He thought if he looked at the matter from that point of view, and considered what price he would, himself, like to give, or what amount he would be prepared to advance, that, in the majority of cases, the surveyor, be he young or old, would not be very far out in his calculations.

It was suggested that it was the duty of a solicitor rather than a surveyor to verify the rentals; and in the case of agricultural property he did not think that verifying the rentals was of much importance. One might, as a rule, rely on the statement of rentals given by the agent or the solicitor with a fair amount of safety; but in the case of house property, and especially small suburban house property, the case was very different.

Experience had shown him that the rentals stated often proved to be only bogus rentals, and that it was not always easy to get at the actual truth. He knew a case of a block of 12 houses supposed to be let at £50 each, or an aggregate of £600 a year (of course deducting the ground rents). As a matter of fact he discovered that nearly every one of the houses was actually let at £45 a year. A three years' agreement was produced as showing the rental value of the property, but so far as he remembered, only three tenants were actually paying £50, the remainder receiving £5 back from the landlord each year. Generally speaking, dealings with country estates were with an entirely different class of people.

He quite agreed with Mr. Rushworth that the surveyor must consider not only the mortgagee, but the mortgagor, and that it was not fair to shirk responsibility in the matter by putting on a price certain to be realised. It must be remembered that the mortgagor, when seeking a loan, was asking to be put on the most favourable terms consistent with the security of the mortgagee. There were cases in which it was not easy to make up one's mind whether a property was worth, say, £1,000 or £1,200, and in a case of hesitation on such a point it seemed to him necessary to consider whether one could not reasonably, with due regard to the interests of the mortgagee, put the value a little above the lower sum.

Another case mentioned by Mr. Rushworth was that of a man who had to buy up properties at more than their inherent value, because they had a special value to him. What was the proper amount to place on property of that kind? He did not think there could be any doubt as to the answer. It must only be such as would give the client a fair security for his advance. That was not, perhaps, always easy to arrive at, and the matter was also complicated by the question, how much was avail-

able for lending? Solicitors did not thank one for telling them straight out that the security was not what it should be, for even solicitors were not sometimes free from the temptation involved in acting for both sides. A solicitor having clients who were trustees desirous of lending, and other clients, builders or others, wishing to borrow, was particularly anxious that the *surveyor* should take the responsibility of advising as to an advance from the investing client to the building client, and sometimes, if one was not very firm, it was difficult to avoid being led astray.

He agreed with Mr. Rushworth that it was only the difficult property which was now brought to surveyors. Solicitors often dispensed with a report and thereby saved the surveyors' fees. He remembered one case which he thought solicitors so acting would do well to "read, mark, learn, and inwardly digest." A solicitor in the south of England, a very able man and of very large experience in the particular district in which he lived, thought he knew so much of the value of property there that he made very large advances, to farmers and others who had bought land in good times, without any surveyor's report whatever. The solicitor, unhappily, as a result, got into difficulties, and then did what others had done before—he used other trust money to make good the deficiency, and, after this state of matters had gone on for years, was adjudged, in the end, a defaulting solicitor. That was entirely owing to the fact that he had thought himself quite secure in making advances on the strength of his own personal knowledge, without the security of an independent surveyor's report on the value of the property.

He thought all would agree that many of the difficulties, which had arisen between mortgagors and mortgagees, would have been avoided if the rule had been followed of having a periodical valuation of the security.

But as long as the mortgagees went on receiving interest they did not like to ask the mortgagor to pay for a valuation, and more than once in the course of his 25 years' experience, he had seen property going wrong from the want of this very precaution. But he did not quite see why this should be left to the initiative of the surveyor. Surely the mortgagee or his solicitor should look after it.

He was pleased to let Mr. Woolley know that there was at least one estate in Leicestershire that could be run at 2 per cent. for outgoings. He had not said that the examples given in his Paper were normal cases, and Mr. Woolley's remark emphasised the very point he desired to make—that in Leicestershire, as elsewhere, there were immense differences, and it was not always wise to take an average of 10 or 15 per cent.

It was not clear, Mr. Woolley said, why the man who wrote the specification for a house should know more of its value than the occupier or mortgagor. But that was not quite what he (Mr. Done) intended to convey. He meant that the man with an expert knowledge of the house and its construction and having an acquaintance with values also, must necessarily know more than the man who only knew the facts as to rent and so on. He had mentioned, in his Paper, houses that had cost £2,000 to build, and were worth only £1,000 in the market when finished; but the point he wanted to make was that, other things being equal, the man who had the more intimate knowledge was in every case the less likely to make mistakes.

The Meeting then adjourned.

PAPER 315
No. 491

# MODERN SURVEYING INSTRUMENTS.

BY ARTHUR T. WALMISLEY, M.INST.C.E. (FELLOW).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, January 15th*, 1906, *at* 8 *p.m.*

CHARLES BIDWELL (President) in the Chair.

In the year 1887, a series of articles descriptive of the use and construction of the best known instruments employed by Surveyors formed the subject of the students' column in *The Builder*. Repetition of the explanatory matter in these articles is not, therefore, necessary, and they will be referred to in the following Paper, so far only as it is expedient to compare the newest instruments of that date with some of the latest modern developments; but since verbal statements, unaided by drawings, must necessarily be somewhat vague and imperfect, I am now exhibiting some of the original diagrams which accompanied those articles.

Every manufacturer aims at some peculiarity of construction designed either as a speciality to contribute towards compactness or to aid facility of manipulation

in the field, and, in our changeable climate, all practitioners welcome any system that saves time out of doors, even at the expense of extra work in the office. In my own experience, there is no survey so accurate as an ordinary chain survey properly triangulated, and the measurement of horizontal distances in levelling operations by the chain is a system unrivalled for correctness. Various ingenious devices have nevertheless been brought forward to attain, not only records of levels but also horizontal measurements by optical instruments (many forming the subject of patents), and for giving greater simplicity of setting up during out-door work, transport in the field, and other improvements calculated to aid speed, accuracy, and concise records, independently of these influences upon the question of price of an instrument.

In dealing with these suggestions, criticism is easier than construction, but it is hoped, although the limits of my space will only permit attention to be drawn to a few modern types of instruments, that this Paper may elicit a practical discussion, with a view to remove the prejudice which exists against the adoption of such new forms introduced as *time economisers* where the accessories can be proved to be free from liability to derangement, and easily attached for use. There have been many consecutive improvements upon old forms of instruments, and the development of modern machinery has greatly contributed to securing perfection of wearing surface combined with solidity. Time will not permit me to deal with questions of the mode and qualities of manufacture, although these are important elements, upon which depend refinement of adjustment together with an even balance of moving parts of an instrument when unclamped, combined with the

advantage of such lightness for transport as is not prejudicial to rigidity.

A beginner should start with an instrument supplied not by a retail trading optician, but by a good firm of manufacturers, although an experienced Surveyor, who thoroughly understands the use of an instrument with which he has to work, may be well able to attain accuracy with a less perfect instrument.

The best form of Level is largely a matter of experience. For a beginner, a 14-inch Dumpy Level without the addition of a compass (which only increases the cost), and with comparatively heavy tripod legs for stability in the field, will undoubtedly prove the most suitable, but an experienced Surveyor can work equally well with a 12-inch or even with a 10-inch telescope supported upon lighter tripod legs.

In the old form of Y Level, the telescope was reversible in its collars over the Y supports, end for end (see diagram A).* In Cushing's Level of dumpy form † the eye-piece is also interchangeable with the object-glass, and in Cooke's Reversible Level the same plan is followed, but with improved attachments. In Pastorelli's Level ‡ the telescope is attached to a horizontal bar rigidly fitted to a stem or pivot, which works by the aid of a ball and socket joint between parallel plates, and proves a very serviceable adjustment in mountainous regions.

Diagram D § shows a form of tribrach in which the levelling screws are made to work in limb attachments so as to avoid straining the vertical axis. The delicacy

* *Builder*, May 28, 1887.
† *Builder*, May 21, 1887.
‡ *Builder*, June 18, 1887.
§ *Builder*, March 12, 1887.

obtained in the process of levelling is here further increased by the fineness of the pitch given to the threads of the elevating screws.

In one pattern, each screw terminates in a semi-circular ball, which rests in a socket upon the lower parallel plate, being secured by a locking plate which is clamped by tightening one or more of the three set screws connected therewith. Thus a uniform motion is obtained without indenting the lower parallel plate on which the vertical screws rest. In the case of parallel plates adjusted by four screws they are, on this account, often made to bear upon small thin pieces of leather, glued to the top of the lower plate under each screw. The value of leather washers under the parallel plate screws is open to argument. They are supposed to absorb shocks, but are found to be prejudicially affected by weather and by the pressure of the screw ends.

In another arrangement of parallel plates adjusted by three screws, it will be observed that any tendency to vibrate in working the instrument is kept below the locking plate, and that the locking plate, shown in plan in one of the figures on Diagram D, assists to maintain the rigidity of the parallel plate connection. This diagram also illustrates the detail attachment of one of the vertical screws, and shows a washer plate for securing the locking plate in position by means of the clamp screw. To counteract any wearing away that may, after a time, occur in the screw portion of the projecting arms to the upper plate, a vertical slit has sometimes been made in the end of each arm, and a side capstan-headed screw provided to each for clamping the joint. Three connecting vertical screws do not jamb the plates, but maintain the support of the upper plate, "as "right as a trivet." To facilitate the setting up,

Diagram D illustrates a device for obviating the tendency to bend the centre of the parallel plates when adjusting a four-screw instrument, as the parallel plate screws should of course never be strained. Mr. R. Blochins and Mr. R. Lyne Freeman connect the parallel plates of new instruments by vertical screws having a deep pitch, through which works a second screw having a fine thread, and terminating in the locking plate; the fine threads work within the deep thread screw, and a small clamp is provided upon the upper plate for use if either one of the deep pitch screws should adjust too quickly for the attainment of a level bearing. When adapting this device to an existing instrument, a second set of parallel plates, connected by parallel plate screws having greater pitch than the existing screws of the instrument, are added. This additional set of parallel plates is attached to the tripod head, and the original set of parallel plates which carry the instrument are connected to this apparatus by a bush, the size of which is dependent upon the requirements of the instrument. The approximate level is first sought by use of the deep pitch screws, and the final adjustment attained with the small pitch screws.

Jahn's level, originally made by Messrs. Elliott Brothers, consists of a levelling telescope mounted upon the ends of a horizontal bar, which is supported upon a tripod head, the details of which are shown upon Diagram E.* The telescope is set level by being placed alternately in positions at right angles to one another, in the usual way, but the adjustment of the longitudinal bubble in one position is effected by means of the wedge-shaped connection turned horizontally by a milled-edge screw, and the adjustment at right angles thereto is effected by means of a vertical screw.

* *Builder*, June 4, 1887.

Doering's level (Diagram F *) provides a gimbal-joint action in a tripod head, so that when setting up the instrument in the field, should the ground be very uneven, the legs of the tripod can be put down anywhere in the most convenient situation for observation, irrespective of level, and the telescope afterwards adjusted by manipulating the vertical arcs of the instrument beneath the telescope. The instrument is first set up approximately level in the ordinary manner by the legs, and brought to a perfect adjustment for taking levels by means of the tangent screws.

The substitution of a gimbal-joint tripod head for parallel plates enables the telescope to be rapidly set level in rough country, but it presents a greater area exposed laterally to the action of the wind, and has more wearing surfaces. In adjusting the telescope by the gimbal joint, after fixing the legs firmly in the ground, the telescope should be held round the body, beneath the compass box, before and during the time the clamps are slackened. One of the arcs may be divided into degrees for measuring vertical angles, if desired.

In a level made by Mr. W. F. Stanley, the centre is cast in hard gun-metal in one piece with, and directly upon, the telescope body and object end, the cast telescope body being bored out to a suitable thickness, so as to provide an instrument combining strength and rigidity, with reduction of weight, compared with the old form of tubular body, collars, and stage. This instrument is denominated the new Engineer's Level, and is fitted with clamp and tangent adjustment, tribrach levelling, and locking plate, so that it can be used on a wall or masonry coping as well as on the tripod.

When the longitudinal bubble in a Level is in the

* *Builder*, June 11, 1887.

centre of its run, the direction of the movement of the draw tube of a telescope should be horizontal. There can consequently be but one position for this telescopic tube which, having been determined by the maker of the instrument, may be regarded as constant. The insertion of a new level tube attached outside the telescope alone disturbs the relation existing between the level of the bubble tube and the telescope; and in such a case a re-determination of its position becomes necessary.

The line joining the optical centre of the object glass and a point in the line of the horizontal wire of the diaphragm should be horizontal when the bubble is in the centre of its opening. This adjustment is effected by the capstan-headed screws at the eye end of the instrument which serve to raise or depress the wire frame or web diaphragm. Whenever the object glass has been removed, a re-determination of this adjustment, known as the adjustment of the line of collimation, is necessary for absolute accuracy. Hence upon receiving a new instrument from the makers I always take the precaution to file a mark across the junction of the object glass holder with the telescope, in order to ensure the replacement of its screwed end in its proper position after removal for purposes of drying or cleaning the object glass.

The horizontality of the line of collimation should be maintained during a complete revolution of the instrument upon its axis. In order to effect this adjustment in Troughton and Simms's Level (Diagram G.*) the bubble attached to the telescope is brought into the centre of its run by means of the parallel plate screws. The telescope is then turned 180° upon its axis, when, should the position of the bubble have changed, half the difference between this new position and its old position is

* *Builder*, April 23, 1887.

effected by the parallel plate screws and the remaining half, in this instrument, by a capstan-headed screw which is placed under the connection stage of the telescope, the axis of this screw working vertically so as to raise or lower a spring, attached to the underside of the telescope near the eye-piece end. This screw is secured by a lock nut, and adjusts the reversion, which though of less importance than the other adjustments of the instrument, is easily effected, and, when in order, saves a considerable amount of time in the field.

The transverse bubble being very short can only serve as an approximate guide to the Surveyor in setting up, and not as an index to the true level of the instrument in a complete circle. Every experienced Surveyor practically disregards the short or transverse bubble and prefers to level the longitudinal bubble in two directions at right angles to one another, so as to secure an accurate circle of revolution.

To adjust for collimation, the Surveyor places the instrument exactly half-way between two staves held at any convenient distance from each other, then brings the longitudinal bubble to the centre of its run and reads both staves. The points thus obtained will be equidistant from the earth's centre, and consequently level. The instrument should now be set up nearly in line with the staves, but not between them; the longitudinal bubble must be brought to the middle of the opening, and, by means of the collimating screws near the eye-piece, the horizontal wire or web may be made to bisect the two level points or others equidistant therefrom. Further explanation of adjustments are contained in my book on *Field Work and Instruments*, page 186. If the distance between the more distant staff and the level be considerable, allowance theoretically should be made for

the curvature of the earth, but as a rule the general conditions of atmosphere do not allow so great a range of vision as to render this necessary.

At the instrument makers' works, an adjusted Level is frequently used as a collimator, to supply a ready means for the accurate adjustment of other instruments in a manner described in *Field Work and Instruments,* pages 185-191.

In most modern Dumpy levels, stadia lines are now added in the diaphragm set to $\frac{1}{100}$, so that in taking the readings, on a distant staff by means of these subtense lines, the Surveyor reads every $\frac{1}{100}$ foot (or metre) upon the staff as being equal to one foot (or metre) of the distance from the centre of the instrument, adding to the reading a constant for any distance shown. This constant is usually given by the maker of the instrument, and can be checked experimentally by the Surveyor.

In Brightmore's collimation adjustment, for use in the telescope of a Level, a sliding plate is attached at the back of the eye-piece, on the face of which cross hairs are stretched, the sliding plate being caused to move in a groove in the diaphragm by a screw pressed against its support by means of a spring. It is made by Messrs Elliott Brothers, and can be fitted to theodolites for adjustment in one or two directions at right angles.

The diaphragm may consist of (a) webs, (b) platinum iridium points, or (c) lines on glass. Mr. W. F. Stanley argues that the use of iridium points obviates the covering of the divisions on a level staff, but Messrs. Troughton and Simms, who have given considerable attention to the construction of optical instruments, adhere to the old form of spider web diaphragms as preferable, both for reading an ordinary level staff or a special stadia rod.

Messrs. T. Cooke and Sons also maintain the superiority of web diaphragms, except for reversible eye-pieces.

The ordinary forms of transit theodolite as shown in Diagram H* and Diagrams J and K † and L‡ exhibit Troughton and Simms', Elliott's, and Everest's patterns.

Mr. W. F. Stanley adds to some of his theodolites a device known as a solar attachment, to enable the Surveyor to establish the true meredian, to determine the correct latitude, and to obtain true time nearly, also mean time, and from this the longitude. The arrangement, which is described in his comprehensive work on instruments, page 236, is claimed to possess advantages over the magnetic needle when used for surveys, as lines can be run and angles measured without regard to the diurnal variation or the effect of local attraction. From the position of the sun in the solar system we are able to obtain a direction absolutely unchangeable, and thus to measure horizontal angles with minuteness and accuracy.

Diagram No. 1 shows a 5-inch theodolite fitted with Fergusson's circles, which give the semicircle divided into four parts, each octant being subdivided into 100 unequal parts by drawing lines through the centre of the circle through the octant arc to intersect 100 equal divisions of the tangent to the octant, so as to be read in percentage divisions of angular measurement on one-half of the circle and in units of a degree upon the other half, thus converting the instrument into a telemeter.

Figure 1 shows a side elevation of the instrument with the telescope placed in a vertical position, and a section of the horizontal plates adjusted with three

* *Builder*, March 5, 1887

† *Builder*, March 26, 1887, and April 2, 1887.

‡ *Builder*, March 12, 1887.

screws, having a central pivot and Fergusson's circle attached. Figure 2 shows an elevation of the instrument and Fergusson's circle with micrometer screw fixed to the telescope and horizontal plate. Figure 3 gives a plan showing the position of the horizontal screw attached to the horizontal circle.*

Hoskold's form of transit theodolite is shown in Diagram No. 2. This instrument is made by Messrs. John Davis and Son, of Derby. Figure 1 shows the elevation of the instrument with the telescope in a horizontal position. Figure 2 shows a side elevation with the telescope in a vertical direction for sighting down a shaft for tunnel work, the provision of this hollow centre, enabling sights to be taken vertically down a shaft, being a special feature of the instrument, Figure 3 gives a plan of the trough compass with long needle capable of being fixed in two positions on the instrument, available for fitting on the top of the telescope or underneath the horizontal plates. Except the bearings, bushes, and screws, all possible parts are constructed in aluminium, and the telescope is fitted with a sensitive spirit level independent of the theodolite part. A plan of the instrument is shown in Figure 4, and a plan of a wall plate with clamping arrangements is indicated in Figure 5. In this form of transit theodolite, an extra large and sensitive bubble is also attached to the vertical circle (see Figure 1). The micrometrical eye-piece reads to one second of arc. The sights above the telescope are removable. The internal vertical axis, which is screwed to the horizontal vernier circle, is made larger than usual, and instead of being solid, is perforated for its entire length, and has a

* A full description of Fergusson's circle is contained in a pamphlet sold by Messrs T. Cooke and Sons, of York.

cylindrical form, the hole through it being about 1 inch in diameter. This axis works in another or exterior vertical axis which is screwed to the underside of the horizontal divided circle, and the axis revolves in a socket which forms the central part of the levelling apparatus. In order to avoid too much friction, the exterior parts of the two axes are, in two or three places, turned down below the general level. A corresponding hole to that in the central axis is made in the centre of the horizontal vernier circle in order to obtain a direct sight through the telescope and centre of the instrument down a shaft or central pier opening. The telescope can be raised through a sleeve or axis collar to clear a horizontal base, enabling standards to be constructed shorter than in most instruments, so as to contribute compactness to the instrument. Some instruments are made with covered limb and turn-up microscopes for protection in conveyance. The instrument is graduated upon silver to read to 15 seconds, but has also a micrometrical eye-piece attached reading to single seconds of arc. As shown in the diagram, a three-screw locking plate with centering motion is provided; the usual lamp and prism are added, and the bubbles are well protected in the construction.

The arrangement for taking small angular records enables a sub-tense process to be adopted, which consists in setting up a rod, say, 20 feet in length at any distance required to be known, and measuring the angle between two metal discs, one placed at each end of the rod, and then by the application of trigonometrical calculations finding the distance required.

Diagram No. 3 shows Messrs. Elliott Brothers' proposed shifting centre for a 5-inch theodolite. Figure 1 gives the elevation of the instrument showing a section

of the shifting centre and the clamping screw to the same. Figure 2 gives the side view of the instrument and its shifting centre. Figure 3 gives a plan of the shifting centre showing the movement obtained in one direction.

Diagram M* shows Messrs. Troughton and Simms's setting-up stand, with movement in two directions.

In Davis's traversing stand, Diagram No. 4, designed for use with the Hoskold Civil and Mining Engineers' Transit Theodolite, when the telescope of that instrument is employed for sighting down vertical shafts, the frame supported by the legs is circular and 12 inches in diameter. This supports a tube across the centre, a corresponding tube, running parallel, being attached firmly to the circumference. Along these tubes a carrier traverses, to which is screwed the usual centering apparatus common to all theodolites. The theodolite is brought approximately over two points fixed at the pit bottom; it is then traversed on the stand, which allows a movement of 6 inches, and it can also be adjusted in any direction for about 1 inch by the centering motion. The centering motion is then clamped, the long traverse is also clamped, and the fine adjustment comes into operation, bringing the vertical spider line into coincidence with the two illuminated marks placed at the pit bottom.

Mr. W. G. Bligh, M.Inst.C.E., introduces a vertical adjustable base, with the view of setting an instrument always at a fixed height above a peg, to attain which the instrument, instead of being screwed on to the top of a tripod, is attached to a thick hollow brass rod which passes through a hollow socket formed in the head of the tripod. This rod, 18 inches in length, can be clamped at

* *Builder*, March 19, 1887.

any desired height, and at its extremity hangs a chain to which is attached a brass disc, so that when the disc touches the top of the peg over which the instrument is set, the line of collimation in the telescope can be arranged to be some even number of feet or half feet above the level of the peg.

Mr. Bligh has also introduced a simple alternative arrangement in which the instrument is mounted on a wooden post which is threaded through a large brass socket formed on the head of the tripod, the purpose of the tripod being to hold the post upright.

In Wells's improved theodolite (See Diagram No. 5), made by Messrs. Elliott Brothers, the principal advantages claimed are as follows:—

1. A method of fixing the locking plate, whereby the locking screw is fixed on the outside, and is easy of access.

2. The winding of the plumb line on a drum through the centre of the instrument, providing an easy method of regulating the height of same, and by this means enabling a plumb bob to be used when the instrument is placed on a fixed stand at a minimum depth below it.

3. A new shifting centre which has two definite movements only, viz.: a sliding and a rotary movement so as to obtain a wide range of action. The former is to be used when the plumb bob is lowered to the level of the station point, the distance from the same being measured, and the instrument moved a corresponding distance on a scale marked on both sides of the plates which hold in position the sliding plate. The centre is then clamped with a locking screw at the bottom of the shifting centre, and the instrument is then revolved on its true centre until the plumb bob comes over the station point. The distance from the station point to

the plumb bob, when the instrument is at zero, is the radius of the circle described, so that when this radius is fixed, the station point must be in the path of the periphery of the circle so described. The shifting centre being self-contained, is, when the instrument is once levelled, always level, no matter in what direction it is required to bring the plumb bob over the station point. This can be adapted to any ordinary theodolite without altering the main construction of that instrument.

4. The use of microscopes and micrometer wheels is introduced so as to read the angle to 5 seconds and compute to single seconds, without short verniers. Thus, taking a length of circumference represented by $79\frac{2}{3}$ degrees as the length on the primary circle divided into 240 divisions we obtain $\frac{1}{239} - \frac{1}{240} = \frac{1}{239 \times 240}$ of $\frac{239}{3} = \frac{1}{720}$ degree or $\frac{1}{12}$ minute (5 seconds).

An improvement in locking the micrometer wheels to prevent the same getting out of adjustment during transit is also added.

The Hoffman tripod head (Diagram N)* combines the action of a ball and socket joint with the rigidity of the ordinary parallel plates. The shifting head of the tripod and its sliding plate are clamped by tightening any two adjacent screws.

The instrument moves, under all conditions, upon a centre common to both ball-joints, this centre being the point to which the hook or chain is attached for suspending the line of the plummet. It is therefore impossible for the plumb bob to hang otherwise than perpendicularly to the horizontal axis of the instrument, and it will be observed that the radius of the curve to the inside of the upper plate is considerably larger than that of the half ball connecting the same with the

* *Builder*, March 19, 1887.

sliding plate, and to which the point of suspension of the plumb line is also attached. When the levelling screws are used to level the horizontal bubbles of the vernier plate in a Hoffman head, the entire instrument turns about the lower small half ball, while the larger upper one remains tightly clamped, as if it had no existence. It is only when the levelling screws are slackened, that the instrument can be moved over the upper large ball surface.

The Hoffman tripod head, as modified by Professor J. H. Harden, of Philadelphia, is thus described by Mr. Bennett Brough in a paper on Mine Surveying.

"On unscrewing the levelling screws, the plate "forming part of the socket of the small ball, and the "centre of which is the axis of the instrument, and the "point from which the plummet is suspended, can be "moved in any direction within the limits of the inside "opening of the screw cap. It will be observed that, "besides the small ball and socket, there is an extra and "larger ball and socket formed by a part of the plate to "which the instrument is fastened, and the part to "which the levelling screws are attached. The latter "part always remains parallel to the screw cap of the "tripod head on which the points of the levelling screws "rest, so that, whatever position the instrument may "assume in relation to the tripod head, the screws will "always act directly perpendicular to both plates. The "levelling screws are covered from dust, and, at the "same time, are no obstruction to the working of the "instrument in any position in which it can be "placed."

In Stanley's new telemetrical theodolite, a mechanical stage is attached for shifting a triangular central plate with exactness over the desired station point. One screw

working horizontally moves the upper plate, and another screw having a horizontal movement at right angles thereto, moves a lower plate. This stand is supported by a tripod having sliding legs adjustable to any height for portability and adaptation to tunnel work.

Messrs. T. Cooke and Sons advocate Littlejohn's patent stand (Diagram No. 4) to provide combined centering and levelling arrangements. This can be easily fitted to an old 5-inch or 6-inch theodolite.

Mr. Stanley's Dunbar-Scott auxiliary top and side telescope (No. 9) being interchangeable with top and side positions and having the means provided to ensure perfect adjustment with the minimum of trouble, claims to form a mining transit which will perform with exactness all requirements in mine surveying and so need no correction for eccentricity. The auxiliary telescope is provided with a centre that may be screwed to the threaded extension of either the transverse axis or the vertical pillars of the main telescope. In either position it is clamped firmly and ranged quickly into alignment with the main telescope by two opposing screws. The diaphragm of the auxiliary telescope has one web only, so placed that it is vertical when on top, and horizontal when at the side. The observation of steep horizontal angles is made with the auxiliary on top, and of precipitous vertical angles with the auxiliary on the side. A counter-balance is provided which exactly balances the auxiliary member, so as to obviate the effect of strain upon the instrument. (Diagram No. 9.)

In Stanley's new model transit theodolite, described in his work on surveying instruments (third edition p. 244), the parts are not built up in separate pieces, but every possible casting is shaped out of the solid into the finished form.

For convenience of packing, I personally prefer the old form of separation in the instrument box, to the single type of complete instrument in one piece; but then "use is second nature," and I have been brought up in the old school, and accustomed to pack the telescope, the body of the instrument, and the parallel plates in separate pieces.

Surface levels can be expeditiously compared by the use of an Aneroid.* The Surveying Aneroid is held in the hand at a known height over a peg or bench mark, and the incidence of the needle upon the graduated scale of heights is read off on the vernier. Other readings taken in a similar manner over points that can be located enable comparative levels to be recorded, due allowance being made for the diurnal wave and local barometrical changes during the time the operations are in hand. Precautions may be taken to neutralise such disturbances by using twin aneroids, two observers being necessary. The one remains stationary in a position as close to the day's operations as convenient, and has one of the aneroids upon a table before him, the reduced level of which is ascertained by connecting it with the nearest peg on the traverse, the level of which is already recorded, and every succeeding half-hour, the observer reads and books the incidence of the needle on the graduated circle for future comparison with the aneroid used at the same time by the observer in the field. The range of the instruments need only be reduced within reasonable limits, as the result is approximate.

Eckhold's Omnimeter, as illustrated by Diagram P,† was first made by Messrs. Elliott Brothers, and is

* See *Field Work and Instruments* (Whittaker and Co.), page 272-275.

† *Builder*, December, 17, 1887.

serviceable for running a traverse survey over rough ground, but it takes time to read the omnimeter scale as well as both ends of a vertical distance upon a rod, whereas a Tacheometer gives a more rapid record. The principle of a Tacheometer and the effect of the addition of a fixed tube and stop piece to a theodolite telescope is shown in Diagram O.* Messrs. T. Cooke and Sons, of York, and other manufacturers make tacheometers. Considering such an instrument as a transit theodolite with an extra lens added to the telescope to convert it into a telemeter, the use of an anallatic or conveying lens ($6\frac{3}{4}$ inches focal length to an object glass of 12 inch focal length) in a tacheometer dispenses with the addition to every reading of what is called "the constant" of the instrument, which is always necessary in the case of theodolites merely provided with stadia lines (Diagram No. 6, figure 6) to attain a similar object.

The principle which governs the action of the instrument dominates its construction. In order to overcome the loss of light occasioned by the introduction of the extra lens, the telescope of a tacheometer is made correspondingly larger than that of a theodolite, while at the same time, eye pieces of higher power are employed, which facilitate the reading of the stadia rod with ease and accuracy. The focal length of the anallatic lens depends in different instruments on the focus of the object glass and the distance the webs are required to measure. The eye-pieces are made to slide vertically across the eye-end by means of a rack and pinion movement, so as to obtain a better view of the outer pair of lines. A very small movement suffices for this. The lines on the diaphragm are usually placed

* *Builder*, December 17, 1887.

so as to provide a ratio of 1 in 50 between the outer pair, and 1 in 100, or 1 in 200 between the inner pair, and the anallatic lens serves to make these values constant for any distance. Readings taken on a staff on which the unit of measurement is divided into 50 equal parts will, therefore, be correct when the outer pair of lines is used; but the difference of the readings must be multiplied by two or four before reduction, when taken with the inner pair. The ratio of 1 in 50 allows the foot staff to be divided throughout into $\frac{1}{50}$ths of a foot, a sufficiently open division to enable it to be read without error at a reasonable distance, but for very long distances an omnimeter permits of greater accuracy than a tacheometer, as the range of a tacheometer is limited by the distinctive readings of the divisions recorded upon the vertical staff.

Similarly, readings taken on a staff on which the unit of measurement is divided into 100 equal parts will be correct when the inner pair of lines, if set at 1 in 100 is used, but the difference of the readings must in this case be divided by two, before reduction, when taken with the outer pair. The metre staff is usually divided into two centimetres and halves, from which results reading to within one-half of a metre are easily obtained.

The circles to tacheometers were formerly divided to grades as in the centesimal method, but many are now manufactured to read to degrees. It is necessary that the position of the anallatic lens with reference to that of the object glass of the telescope shall be fixed and unvarying, and hence the adjustment to focus is maintained at the eye-end of the telescope.

The principle of the action of the anallatic lens in automatically referring all readings to the centre of the instrument may be explained as follows:—

Let O (Diagram No. 6, figure 7) be the object-glass, L the anallatic lens, and A the vertical axis of the instrument, while S S is a staff, or stadia rod, held at such a distance that $\frac{SS'}{DA}=\frac{1}{100}$ and let S A, S′ A be two rays, which, if produced, would meet at A. But the effect of the object-glass O upon these rays is to refract them so that they converge more rapidly, and after crossing each other at the small a, in the diagram they fall upon the anallatic lens L (which has a principal focal length = La) at P′ and P respectively, and emerge therefrom as the parallel rays $L_1$ $N_1$, L N to the eye-piece.

Now, if the staff be brought nearer to the instrument, say, to the right hand S S′, then $\frac{ss'}{DA}=\frac{1}{100}$ as before, and the rays s A, s′ A follow the same course as previously. Hence, if the stadia lines are placed so as to cut the parallel lines $L_1$ $N_1$, L N it naturally follows that all readings are automatically referred to the centre of the instrument as required. In a book by Mr. Neil Kennedy, entitled *Surveying with the Tacheometer*, tables are given for reducing distances and heights and for comparing centesimal graduations to sexagesimal, but the book is not of a suitable size for use in the field.

The Bell-Elliott tacheometer (Diagram No. 6) has a powerful microscope permanently fixed at right angles to the telescope as in Eckhold's omnimeter (Diagram P) both the microscope and the telescope revolving upon the same axis. A special staff 10 feet long accompanies the instrument and this staff is fitted with two sighting cross pieces (Diagram No. 7), the lower one being preferably adjustable in vertical distance from the upper one. This tacheometer forms a tangent reading instrument, the vertical height and the horizontal distance from the vertical axis of the instrument being calculated from the tangent of angles read upon the staff. The

natural tangent of any such observed angle is read direct either from the drum scale or from the drum and tangent scales combined. Hence the use of tables in the field is not needed. The tangent scale can be moved backwards and forwards by means of the micrometer drum-head attached thereto, which in one revolution causes the tangent scale to move a definite number of parts of the radius determined from the axis of the instrument. By reference to Diagram P illustrating the omnimeter, it is easily seen how, by similar triangles, the scale is made to apply to the required measurements. A detailed account of the use of this instrument will be found in *A Practical Treatise on Segmental and Elliptical Oblique or Skew Bridges*, by Mr. G. J. Bell.

In June, 1904, in a Paper read in London at a meeting of The Institution of Mining Engineers, a description was given, by Herr A. F. Eoll, of the Hammer-Fennel tachymeter theodolite, in which a diagram of curves (upon glass similar to a magic lantern slide) is viewed at the same time as the tacheometer staff, by means of an extra optical arrangement provided within the tube of a Porro telescope. The diagram curves are calculated to enable the line of collimation to appear to intersect them at different points upon the staff for any angle of inclination of the anallatic telescope employed in the instrument.

Mr. W. H. Wells, M.Inst.C.E., F.S.I., introduces into the diaphragm of a level a second horizontal cross-line, fixed either above or below the central cross-line used for collimation, at such distance therefrom as to bear a relative proportion to sights read through the telescope at a distance of 100 feet apart. This he calls the application of the law of perspective to the reading of such distances. The vertical readings are

taken upon the two cross-lines of the diaphragm so as to record the vertical space upon the staff at a distance of 100 feet from the centre of the instrument. If the second cross-hair is so placed as to record one foot distance vertically on the staff, above or below that read by the centre cross-hair then the proportion of vertical distance to horizontal distance is 1 in 100, and thus, by this simple contrivance other distances may be relatively arrived at.

Mr. J. Short's gradient telemeter level, supplied by Mr. Casella of Westminster, also seeks to obtain lineal distance gradients for railways, irrigation, drainage works, &c., by the aid of a level staff, without the use of a chain or tape, regardless of rough and broken ground or the intervention of a stream or other water between the observer's station and the distant object.

Another form, designed for taking vertical inclines at fixed small angles, is known as Stanley's gradiometer. By means of an open extended scale, which may be read without the use of a vernier, it proves a useful levelling instrument, as the telescope can be put level instantly at any sight by moving the drum without any setting up whatever by the levelling screws. When the drum is at zero, it forms an ordinary level. The gradiometric arrangement is effected by the telescope being mounted in trunnions, one being adjustable vertically, the amount of elevation or depression being indicated by a drum graduated to read any rise or fall, from 1 in 12 to 1 in 1,200.

Stanley's inclinometer (Lister's patent) is somewhat similar in construction to a theodolite, but with the addition of an extra vertical axis to the telescope carried through the horizontal axis at right angles. By this means the telescope can be moved upon this

supplementary vertical axis in a plane of any inclination desired, so that if the horizontal axis is set to the slope of a railway cutting, a number of pegs may be set out continuously with the same setting by direct observation through the telescope across any inclination of the land surface. The slopes for curves also are readily pegged out by means of the special horizontal angle repeater with which the instrument is fitted, so that one angle only need be set, and that can be repeated round a circle until complete, when the angle repeater is simply released and a straight line can be proceeded with.

By the use of such instruments, an immense amount of work may be saved in setting out the surface of land for widths of slopes or batters by pegs, over the ordinary system of pegging, by calculation with a theodolite, where each peg requires a separate setting of the instrument. In taking cross sections and all levelling on sloping, uneven ground, the saving of time and labour is also very great, and the work resulting therefrom is sufficiently accurate for trial sections and preliminary investigations.

In Sir George Leach's level, described in the *Transactions* of The Surveyors' Institution, vol. xxxii., page 523, a small telescope with a spirit tube on the top is pivotted off its centre towards the object end, on a thin brass circular plate with a weight under the centre to keep the instrument level laterally, and the cross hair horizontal. The level itself is actuated by a small fine-threaded screw directly under the telescope, working freely on the circular plate. The end of the pivot being spherical, and the plate circular, the telescope and level can be revolved in any direction. Adjusting screws are provided to place the level in accurate adjustment, and a levelling staff, rather over eight feet long (folding in

half for convenient transport) accompanies the instrument.

Mr. Sheldon's suspension level, made in 1893, can be used for taking flying levels between two fixed points, by stretching a fishing-line or thin wire over a distance of about 100 lineal yards in order that the level of one point may be transferred to another point. When the bubble is in the centre of its run in the centre of the suspended line, the extremities of that line are at the same level, and when the ends of that line are at the same level the bubble of the instrument will be in the centre of its run in the centre of the suspended line. By reversing the bubble at each suspension in the continuity of the work, accuracy is contributed and the instrument is applicable to any ground across which a line can be stretched between two ranging rods. It can be used in open trench work for setting out water or drainage construction, or in tunnel work when levelling between the bottoms of two shafts, also as a straight edge level, and as a soffit level, as well as a suspension level, there being an opening in the metal cover at the bottom of the bubble tube, so that it can be viewed from underneath.

Mr. Thomas Ferguson, in a little book published in 1904 by Messrs. John Bale and Sons and Danielson of London, has dealt with automatic surveying instruments, and their practical uses by pedestrians, and as applied to vehicles on land and water, by which an itinerary may obtain records of measurements between two extremities of not too great a length and, in a minimum period of time, data sufficiently precise for general reference.

In 1880 Mr. A. M. Rymer Jones described, in a Paper published in the Institution of Civil Engineers' *Transac-*

*tions*, Vol. lxi., an account of an instrument called "The "Temnograph," for recording in the field, a delineation of the surface of the ground. In open country where there may be no intervening hedges, it serves its purpose.

Mr. W. F. Stanley has a combined mining dial, level, and theodolite, fitted with sliding stand, and Hoffman head with clamp and tangent movement to the limb. The telescope is fitted with stadia points and a gimbal carriage, cranked in form, and enables the Surveyor to read through the telescope at right angles in two directions.

Messrs. Adie of Westminster have also brought out a combined Level and Theodolite (Diagram Q).* Used as a transit theodolite, the telescope is rendered steady by the attached vertical circle, but when used as a level a German clamp is introduced for the purpose, as shown in this diagram. I do not advocate the adoption of combination instruments. They are very ingenious, but a Surveyor generally has notes to make relating to external circumstances, besides recording angles and distances, and he does not need his attention to be distracted by clamp screws which are not required to be manipulated for the special object of the inquiry.

In reflecting hand levels such as are shown on Diagram R,† the reflecting plate divides the vision half into a direct or through sight, and half with the reflection of a bubble in a mirror. The same process forms the principle of Captain Abney's level, shown upon the same diagram. Sir Howard Grubb has sought to improve this arrangement by producing, with the aid of chemical deposition of a specially prepared film upon a plate of glass, a surface rendered capable of reflection, while simultaneously transmitting a large percentage of the light

* *Builder*, April 9, 1887.
† *Builder*, June 25, 1887.

which falls upon it, so that two objects in different directions are presented to the eye of the Surveyor, either directly (see Diagram No. 8) or through the object glass of an observing telescope. These instruments are made by Messrs. Hicks, of London, and by others.

The ordinary circumferentor, and Lean's miners' dial are shown on Diagram S.* In the Grubb miners' dial, the object to be observed is viewed through a tube. The sight and object are virtually on the same plane; there is, therefore, no strain on the eyes due to focussing two or more objects at different distances. The eye need not be close to the sight, nor in the centre of the sight, as there exists no parallax error in the Grubb instrument. The sight is readily illuminated underground, and may be preferably constructed of a short piece of rectangular brass tube, about ¾-inch square, 3 inches long, open at both ends. About midway in this tube, fixed at an angle of 45 degrees, is a plate of glass, coated with a semi-transparent and highly effective film, chemically deposited on its surface, as previously described. At right angles to the square sight, and opposite to the reflector, a circular tube is fixed. At one end is a diaphragm coated with opaque material, through which are cut or photographed cross-lines, a star, a scale, or any other convenient device. At the base of this circular tube is an achromatic lens, of a focus suitable to the distance between the lens and diaphragm. This achromatic lens brings into parallelism the luminous rays from the markings on the diaphragm, which rays are bent at right angles by the reflector and directed into the eye of the observer, the result being that the rays from the diaphragm enter the eye under exactly the same conditions as if from the distant object,

* *Builder*, Feb. 19, 1887.

and the Surveyor sees the image or sight-lines virtually superposed on the distant object, that is, at the same distance.

Miners' dials have been, from time to time, greatly improved, the sight vanes mounted a considerable distance apart to provide a long line of sight, verniers have been constructed to read to a degree of accuracy which is difficult to plot, centres have been lengthened to effect accuracy in reversing, fine adjustment screws have been added, in same cases a telescope has been attached, which is always difficult to illuminate satisfactorily in a pit. The sight frames, however, are the same, with little improvement since the earliest miners' dial was designed; consequently the same physical difficulties occur, *e.g.* the attempt to focus the foresight, backsight, and the object simultaneously, when situated in different planes, and the difficulty of keeping the eye rigidly fixed upon the centre of the backsight to avoid errors in parallax.

Sir Howard Grubb's circumferentor, described in *Scientific Proceedings* of the Royal Dublin Society, is primarily intended for rapidly observing horizontal and vertical angles for military purposes; but is also available for underground survey work, mines, &c. (Diagram No 8.)

It is not claimed for the Howard Grubb system that it will displace the telescope in standard instruments, such as the theodolite and level, but such instruments are often used for work for which they are not suitable, and in which their accuracy, delicacy, weight, and size are a disadvantage. Portable instruments, such as the clinometer, Abney level, and Prismatic compass may be constructed with the Grubb sight, and without complicating the effect of observation; the level angle of declination or direction may be simultaneously observed. The

main feature of the Grubb sight is that it seeks to eliminate errors due to parallax, as the rays of light enter the eye in parallel lines by the aid of the pair of convex lens introduced in the construction.

The instrument is designed upon principles similar to those used in the prismatic compass and the clinometer (Diagram T)*; but the demerits of the prismatic compass are the shortness of the line of sight due to the small diameter of the instrument, the tendency to force the needle when the box is tilted in use upon uneven ground, and the effect of weight of the graduated card or rim carried by the magnetic needle which tends to introduce sluggishness in the movement of the needle.

When the base A A of the Grubb instrument is screwed on to the stand, the pin D in the centre is raised a little, and the whole cover C C rotates upon that pin, so that the upper portion of the box attached thereto turns freely over the lower part.

If it be desired to measure horizontal angles, you level the instrument roughly, and looking through the glass G in the direction shown in the diagram you sight your first object, which is easily focussed, as you have a very large field of view, and holding the lid with one hand, you turn the lower part of the box with the other hand, until zero of the scale corresponds with your object, then you turn the upper box or lid round until you sight all your other objects in succession, each of which objects will have its correct bearing with reference to the first object projected upon it.

In order that the divisions may appear to be absolutely steady upon the object, whether the eye be moved backwards and forwards or sideways, or during the revolution of the cap, it is necessary that the optical

* *Builder*, January 29, 1887.

centre of the two lenses, which parallelize the rays, should exactly coincide with the mechanical centre upon which the cap turns, and that the foci of the two lenses combined, should be exactly equal to the radius of the transparent scale.

The instrument in its complete form, mounted upon a tripod stand, can be turned with its central axis into a vertical or horizontal position, so that vertical as well as horizontal angles can be taken.

Sir Howard Grubb finds it to be an advantage to coat a small strip at the bottom of the leaded window with silver. The rest of the glass he allows to be coated with a very thin coat of lead, because if the conditions are such that it is difficult to see the scale in the leaded portion of the glass, for instance when looking at a very brightly illuminated object and less illuminated on the scale, it is always possible to lower the eye and see the scale itself in the brilliantly reflected part, *i.e.* by the silver, and thus obtain the advantages of the semi-transparent film, while at the same time, under the most adverse conditions, the scale can always be seen with the full brilliancy.

The economic use of the Plane table in topographical surveying is fully described by Mr. Josiah Pierce in a Paper read in 1888 before the Institution of Civil Engineers (see vol. xcii., page 187, of Min. Inst. C.E.). Puller's new tachymeter (described in Min. Inst. C.E., vol. clii., page 368) seeks to obtain the plans and levels of the observed points without the necessity of noting the distances and horizontal angles, and thereby enables the Surveyor to dispense with the labour of calculating and checking the results. This instrument consists of a horizontal circular plate, about 16½ inches in diameter, mounted on a tripod. The plate is graduated to read

horizontal angles, and at the centre is a vertical axis carrying a telescope upon one side and a projective apparatus upon the other. The arrangement consists of graduated horizontal and vertical scales connected to the telescope and receiving motion from it, and by means of which the distances and heights are read off, and the observed points plotted, when weather permits, upon paper stretched upon the horizontal plate by pressing a needle-point into the paper. Further description is given in Min. Inst. C.E., vol. cliv., page 395.

The Eidograph has superseded the Pentagraph, as by its principle of construction, the friction of the supporting wheels to the Pentagraph is entirely obviated, and there is consequently less damage to the drawing paper involved in its use. A level drawing board or table free from indentations is desirable.

The Eidograph (Diagram U)* consists mainly of three stout brass bars, one of which is supported by a central fixed stand over which it works. When employed for reduction, as shown in the detail plan, the portion of the central bar carrying the bar marked A is heavier than the portion of the central bar carrying the bar marked B. The bar marked A carries the tracer and the bar marked B carries the pencil. The central bar is clamped at C. Hence the balance weight is placed upon the short end of the central bar to steady the instrument in such a position that the whole is balanced over the fulcrum under C.

The geometrical construction of the instrument is based upon the principle involved in the construction of similar triangles, and consequently the pencil-holder, the tracer, and the fulcrum should, in all circumstances, be in a right line when set up ready for use, so that a fine

* *Builder*, October 22, 1887.

string stretched from the pencil-holder to the tracer-holder should pass over the fulcrum as indicated by the dotted line shown in the diagram.

Amsler's Planimeter (Diagram V)* is arranged for the measurement of areas in square inches (or other unit if specially desired). The needle point may be either outside or inside the area on the diagram to be computed. The former plan effects the best position for the instrument. A perfectly level table is essential for accurate work.

With the needle point inside the diagram the Surveyor circumscribes the diagram with the pointer in the direction of the movement of the hands of a watch and the counting disc records whether the total rotation of the recorder is a forward motion or a back motion. When measuring very large areas, it may happen that the counting disc moves through several revolutions.

Any slight non-coincidence due to play between roller and disc may readily be allowed for in taking readings.

The area corresponding to a total revolution of the roller is usually 10 square inches, and is engraved on the weight placed over the needle point, when in use.

With the use of a planimeter arranged for measuring areas in either of several units (English and French) the Surveyor adjusts the sliding tube on the bar so that the index mark on the tube coincides with one of the marks on the bar.

A practical description of the planimeter was given by the late Sir Frederick Bramwell at the British Association Meeting in 1872, and is published in the Report of that Association.

Professor Goodman has patented a planimeter, the use of which is described in my book on *Land Sur-*

* *Builder*, October 29, 1887.

*veying and Levelling*,* pages 158 to 161. It consists of a tracing leg held in the right hand, and a hatchet held at a point outside the boundary to be traversed, the instrument forming an inverted channel. The hatchet should not be allowed to work on a rough surface —smooth writing or drawing papers are alone suitable. This instrument is simpler than Amsler's planimeter in construction, but is not likely to be so extensively employed for accurate work.

Mr. J. Bridges Lee has shown how photography may be combined with surveying, in a manner that shall fix the direction of view upon a plan, so as to embrace full detail as viewed through a telescope, and he argues that having all the landscape thus recorded, a Surveyor can select at leisure any topographical details he requires to be known. A complete description of this photo-theodolite is given by Mr. Bridges Lee in a paper read before the Society of Engineers in 1899. He effects his purpose by adding a fixed focus camera set up on a stand and accurately levelled so as to make the picture plane truly vertical. The line of view is also marked on the photograph, and its position on plan recorded upon an horizontal plate whose centre is vertically under the centre upon which the attached telescope revolves.

It is probable that photography will prove quite as satisfactory a process as the method of fixing survey lines by the magnetic needle of a compass for general plans, and that it will come gradually in greater use for assisting the Surveyor to record not only the base lines of plans, but the vertical section lines of the surface of the ground. Building plans, in which dimensions are to be stated, must, of course, be correctly measured in the field, but for

* London, Whittaker and Co., 1900.

index or key plans showing general position and surroundings, the value of photography is universally acknowledged.

LIEUT.-COL. SIR GEORGE LEACH, K.C.B. (Honorary Member), said that, as one of the older Members of The Institution, who of late years had not often had an opportunity of addressing a meeting, he had marked with the keenest interest its growth and prosperity, and availed himself of this occasion to congratulate the Members upon its great success and the prominent position which it now held.

He had great pleasure in moving a vote of thanks to Mr. Walmisley for his very able Paper, which would be most valuable to Members as a record of the improvements in surveying instruments, and a clear account of their use and advantages for practical purposes.

Surveying varied very much in character, and instruments must in every case be adapted to the purposes of the work to be done. Whether it was mining surveying or surveying on a large scale on the surface, or accurate geodetic surveying, or what one might call hasty surveying over wide districts, or whatever its nature, the instruments used must be adapted to the purposes for which they were required.

He found no reference in the Paper to the most magnificent surveying instruments ever made—the two theodolites with three feet circles, made a great many years ago by the original firm of Troughton and Simms. One was made for the Royal Society and the other for the Ordnance Survey, and they were both used in the great triangulation on which the Ordnance Survey was founded. One of them was now in the South Kensing-

ton Museum, and was well worth inspection, for it was certainly, as he had said, the most perfect surveying instrument ever produced. Of course, no matter what the nature of the work might be, the instruments were all based upon the same principles, but an ingenious man would probably discover little changes which would facilitate his own particular work. One of his own hobbies was landscape gardening, and of course he need hardly say that in laying out roads a level of some sort was necessary. He had tried first of all a reflecting level, and, although he had a steady hand, still he could never feel complete confidence in his work, and he therefore designed a small very portable level that could be relied on to do accurate work at short distances.

To make such a small level required, of course, some little alteration in the construction. He had his ideas carried out by Stanley, and the result was an instrument with which one could level three or four miles with an error of only a couple of tenths. It was not a toy, but a really practical tool. It had been found useful in India and also for architectural purposes. An architect had constantly to take levels over the site of his buildings and the roads thereto, and found he could accurately complete his work with this level, which he could carry in his bag, with a light staff so made as to act as a walking stick.

He was himself rather astonished to find that with a very light tripod, like one of the light photographic camera stands, it was very little affected by the wind. He had used it in windy weather when he expected it to shake considerably, but it was perfectly steady, and he had no difficulty in getting his work accurate—or quite near enough for his purpose. Of course, in levelling for

50 or 60 miles of railway, one must use a better instrument.

When, in his early years, he had been engaged in the determination of levels all over the country with the ordinary plain level, he had found no difficulty in getting the most accurate work done. He had suggested and adopted a process, which he might mention, as possibly useful to other surveyors. It was a rule in the Ordnance Survey never to use a staff more than 10 feet long, and to have it always in one piece. The staff was shod or bound with metal at both ends, and the surveyor's duty was to take what were called direct readings back and front, *i.e.* with the one-foot mark at the bottom. The staff was then reversed, end for end, and instead of reading from the bottom he read from the top, the figures being reversed, and did the same with the back reading. There were thus two distinct levellings, the direct and reverse, and in order to prevent the possibility of the surveyor reading the second time the exact complement of his first readings, he was furnished with a little tripod on which to raise the staff for the second readings, so that he took the direct reading from one base and the reverse reading upon another which was not quite at the same level, and thus could not get the precise complement of the first reading.

The result was that, for a great deal of the levelling, it was possible to do with one levelling instead of two, as had always been the case before, and that saved a very large amount of expense. That hint might be useful to surveyors when they wanted accurate levelling, though not the extreme accuracy which was occasionally necessary.

In conclusion, he would only repeat that it gave him

the greatest pleasure to propose a most hearty vote of thanks to Mr. Walmisley for his exceedingly useful Paper.

Mr. C. JOHN MANN (Fellow) said he was very pleased to have the opportunity of seconding the vote of thanks to Mr. Walmisley so ably proposed by Sir George Leach. It had been his good fortune to be associated, in a humble way, with Mr. Walmisley in some of The Institution examinations, and he well knew how thoroughly he was master of the subject.

Looking at the elaborate drawings which Mr. Walmisley exhibited to illustrate his Paper, one must be struck with their painstaking detail, and he felt himself quite unable to enter into any argument on such a very intricate and highly technical subject.

As a building surveyor, it was not often necessary for him to make himself acquainted with very elaborate instruments, although, of course, he sometimes had to use some of those to which Mr. Walmisley had alluded. He was pleased to hear the author say that, in his experience, there was "no survey so accurate as an "ordinary chain survey properly triangulated, and the "measurement of horizontal distances in levelling opera-"tions by the chain is a system unrivalled for correctness," and he was also glad to hear that he did not prefer the more complicated combination instruments. It would be interesting to all surveyors to watch the important part that photography was likely to play in connection with survey matters.

He thought the younger Members of the profession especially must be deeply indebted to Mr. Walmisley for the pains and trouble he had taken in the preparation of

this Paper, and he was sure they would be able, if not to criticise it, at any rate to gather from it much that might be of benefit to themselves in the exercise of their profession.

Mr. J. W. TYLER (Fellow) said he had much pleasure in supporting the vote of thanks to Mr. Walmisley for his very excellent Paper. It was quite evident that he had expended a very great deal of pains in preparing his Paper and the excellent diagrams; and those younger Members who were going in for the examinations would, he was sure, derive great benefit from his efforts. It did not fall to the lot of every Member to use all the elaborate instruments described, but he supposed nearly everyone had occasionally to use a theodolite, and perhaps more frequently a level.

He should like to make a few remarks with reference to those instruments with which he had been brought into contact. As to computing distances by means of a level with stadia lines, he had found this method generally of assistance in making preliminary surveys for railway work, which he thought could be done with a considerable degree of accuracy. He had found that by that means one could calculate the horizontal distance with quite sufficient nicety for general purposes, and the saving of time was an undoubted advantage.

The question of spider-web *versus* cuts on glass was an interesting one. He remembered once taking some levels where there were small boys in the neighbourhood, and, having had to leave his instrument for a short time, finding, on his return, that they had removed his eye-piece and put their fingers in, with disastrous results to the spider-web. In case of breakage, if one were at a

distance from any source from which one could get spider-webs, the position was a hopeless one.

The best material for the construction of instruments was a question of some importance. Aluminium had been introduced very largely, but he rather gathered that, in the opinion of many of the leading instrument makers, it was not altogether desirable for the more substantial class of instruments like the theodolite. He had always used a very heavy theodolite, and found that even that was none too solid for the wear and tear it was subjected to. He remembered using one of Cooke's theodolites, weighing about 40 pounds, when a tremendous gust of wind blew it over, and it took him a long time to put it into adjustment again, although it was not so seriously injured as to prevent his using it.

As to tripods, he now used the open form of tripod in preference to the old-fashioned round form, for he found it had more rigidity. It might be more cumbrous, but, on the whole, he preferred it.

The prismatic compass was undoubtedly a handy instrument in occasional circumstances, but when accurate work was required he preferred to use some more reliable instrument, such as a box sextant.

Mr. D. GRAVELL, M.Inst.C.E. (Visitor), said, after the exhaustive manner in which Mr. Walmisley had treated the subject, he did not think it was possible to add anything to what had been said. One could only express amazement at the enormous number of instruments which had been invented and constructed.

He thought that one of the principal improvements, which had been made since Mr. Walmisley's series of

articles in the *Builder* in 1887, was the use of the micrometer screw, as applied to theodolites, instead of the vernier. By the aid of the micrometer screw attachment, with a 5-inch theodolite one could certainly read, without difficulty, to five seconds. That, of course, for ordinary theodolite work was a very much greater degree of accuracy than was necessary. It would be of use for tunnel work, but for ordinary small work the vernier arrangement, where one could read to, say, 30 seconds, was ample.

Reference had been made to the method of testing levels for collimation. He was rather interested in ancient literature on the subject, and had recently been reading a book dated 1725, a treatise on the surveying of that time. The frontispiece included an illustration of a level and of a theodolite of the period. No scale was attached to the diagram, but judging from the length of the legs, say five feet, the length of the telescope of the level was about half that. For the purpose of adjusting the collimation he found that the same principle was adopted as at the present time, viz. 3 pegs at a given distance. He remembered that when he was a pupil 5 chains was generally adopted but in that book 20 chains was recommended.

A minor matter, but still one of some importance in practice, was the question as to the division or numbering of the level staff. He had at the present time a level staff with the 9 indicated by a Roman IX., but unless great care were exercised one might easily mistake this for a Roman XI. He would advocate, for the 9, the inverted 6, but with the top loop of the 9 filled in as a solid block. He thought that would sufficiently call the attention of the observer to the difference between the 6 and the 9.

With regard to the respective merits of the 4-screw arrangement and the modern 3-screw, lately used for theodolites and levels, he was sure the instrument could be brought much more accurately to the level by three than by four screws. At the same time four screws had an advantage, especially when using a theodolite in a country of very uneven ground. Of course, with a level, one had merely the one point in setting up to attend to, but in setting up a theodolite one had to set up the instrument fairly level and at the same time to get exactly over the point from which one was to take the angles. With the 4-screw instrument, the distance from the main axis of the instrument to the axis of the screw was about one-half of what it was in the 3-screw instrument. Consequently, with a single turn, one could tilt it to twice the extent that was the case with the 3-screw arrangement. Therefore it was possible to attain a much greater amount of effect with the 4-screw than the 3-screw, and on uneven ground this was a very great advantage.

One heard the chain referred to constantly as being the best method of working for arriving at a really thoroughly good survey; but he was surprised that the chain was in use at all, except for the roughest work. The chain ought, he considered, to be relegated to the top shelf where it could not be got at without a great deal of difficulty. The steel band he was satisfied was infinitely preferable. He first used the steel band in Moldavia some 20 years ago when working with French engineers, and it was while there that he learned to appreciate its use. It required, of course, much more care in handling than the chain, but nevertheless, for an intricate survey which was to be plotted to a large scale, there was nothing like a steel band.

One simple matter he might mention in connection with making a survey to be plotted to a large scale for bridge construction, and so on, supposing a 50 foot steel band to be used. In setting out one's lines with the theodolite it was desirable to go over the line, in the direction it was to be set out, first of all with the tape, making a chalk mark at the first 49 feet, the next 50 feet, the following 50 feet, and so on for the length of the line. Having done that there should be ranged in, with the theodolite, nails driven at each of these lengths. By this means, when the measuring in with the steel band was proceeded with there was a point about a foot short of each band length over which the band could be laid and accurate allignment ensured, the nails serving as station points. In the setting-out of one of the London tube lines now approaching completion (the Piccadilly section of the Great Northern, Piccadilly and Brompton Railway, Sir James W. Szlumper and William W. Szlumper, Joint Engineers) a seven-inch theodolite was used with micrometer readings, whereby a second can be estimated. For the lineal measurements a steel band was used, laid with a tension governed by a spring-balance.

Sir GEORGE LEACH said he should be glad to be allowed to make one more remark, in order to give the opinion of a very distinguished man, on an important point in connection with many of the instruments that had been referred to. He remembered having on the Ordnance Survey a 2-feet circle theodolite, which could not be got to give good work. Everyone tried, it but could not get satisfactory results, so he asked Sir George Airy, the Astronomer-Royal, to look at it. It looked a perfectly solid instrument with very substantial pillars

and parts, and no one could imagine what was the matter with it. Sir George Airy said at once that the instrument was not solid enough. There was a certain amount of spring in it, and it would never give good work until those supports were removed and much stronger ones substituted. That was done by Troughton and Simms, and that instrument afterwards gave splendid work. It would be remembered that one of the features which distinguished the instruments that Sir George Airy produced, which were now at Greenwich, was their great solidity. He did away with all light brasswork, and, whenever he could, he introduced cast iron to give the greatest possible strength and the smallest amount of spring. He thought that a very important point where accurate work was wanted, and one which should be borne in mind in making any class of instrument. They should be as low as possible and as strong as possible. The more rigid they could be made the more certainty there was of getting a perfect instrument.

The vote of thanks having been put to the Meeting and carried unanimously,

Mr. WALMISLEY, in reply, said he wished to thank the Members for the very patient way in which they had listened to his somewhat lengthy Paper, and for their kindness in passing so cordial a vote of thanks to him for his efforts.

There was no doubt that some of the modern instruments, which he had brought to the notice of the Meeting, were very ingenious and possessed certain merits as time economisers, but would be more used abroad for approximate work than in this country,

where all the work which remained to be done had to be minutely accurate. He did not mean that one might do inaccurate work abroad, but of course the preliminary surveys and investigations were of a very different character from those made in this country, where every extra acre of land was an important consideration.

He had listened to the discussion with great interest. He was perfectly aware of the accuracy of a steel band, but for many reasons the chain commended itself to him. For instance, if one were crossing roads, a heavy iron chain would let a cart go over it without sustaining any injury. A light steel chain was best for crossing open country where there were very few public roads, and was not so apt to snap as a band, but improved arrangements were being made for winding up bands which would greatly increase their convenience, and, in any case, their superior merits for very accurate work could not be denied.

The Meeting then adjourned.

PAPER 316.
No. 492.

# THE VALUATION OF MACHINERY FOR RATING PURPOSES.

BY FREDERICK MARSHALL, K.C. (ASSOCIATE).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, 29th January,* 1906.

CHARLES BIDWELL (President) in the Chair.

I have had some hesitation in bringing before you a subject so well worn as that of the rating of machinery, the principles of which, from the reading of the law reports, we might suppose to have been settled upon clear and distinct lines for at least half a century. During the last 30 years, however, a feeling of uncertainty as to the application of those principles has been gradually growing until it has developed into something like two rival views, having little in common with each other.

It is agreed that machinery cannot be directly rated, and that the only way in which the parish can put it under contribution is to regard it as enhancing the value of the hereditament with which it is connected,

and which is the direct subject of assessment. But how to do this is the problem which has given rise to so much difference of opinion.

On the one side, it is contended that the only practical way of measuring the enhancement is to consider what the machinery is worth as it is and where it is, and to put on such a percentage as a landlord could afford to let it at and a tenant would be reasonably likely to pay, as representing the addition that should be made to the rent of the building for the purpose of assessment. On the other side, the argument is that capital values and percentages are entirely beside the question, and that what the valuer has to find is the additional amount which a tenant would be willing to pay for the convenience of having the machinery *in situ* and the building adapted to it as a going concern.

Unfortunately, the courts of law have not, of late years, given much assistance to the valuer in deciding between these rival contentions, viewing it rather as a question of fact for him to settle with the help of his experience and good judgment, than as a matter of law upon which any definite rules ought to be laid down for his guidance. Incidentally, however, some light is thrown upon the subject by the cases which have been from time to time decided, and especially the earlier ones. It is with the view of giving what little assistance I can to diminish the uncertainty which prevails in the application of the law, that I have put together the materials of the present Paper. At the same time what I am most anxious to elicit is the opinions of those experienced valuers who may be induced to take part in the discussion, and who will be able to give the reasons suggested by their long practice for adopting the views they entertain, on the one side or the other.

It is not necessary to say much about the cases prior to the year 1840, when the Act for exempting personal property from rateability was passed, except the case of the *Queen* v. *Guest*, to be referred to later on, where it happened that, in the particular parish concerned, personal property was not charged to the poor rate. In the case of the *King* v. *Lord Granville*, in 1829, a lessee of a coal mine, who was also the occupier, had erected a steam engine and laid down a railway for the working of the mine. His royalties amounted to £802, and he was rated at £989, the difference of £187 being charged in respect of the engine and railway. He was held to have been properly rated at the larger sum; the court remarking, in reference to one point raised in the case, that it was immaterial whether the engine and railway had been put in by the tenant or the landlord. In that case, however, the additions were pure fixtures, and became part of the realty by their physical attachment to the soil, so that the case does not help us with regard to the debateable articles of machinery which form the chief subject of contention at the present time.

Next comes a group of three cases, in which the general principle as to the rating of machinery was laid down. The first was *The King* v. *The Birmingham and Staffordshire Gas Company*, in 1837, which again gives us little help, because there all the machinery and apparatus used for the purpose of manufacturing, whether fixed or not, had been excluded in the assessment, and the valuation was naturally held bad. Lord Denman, however, said that, even where the machine had not been attached, a house had been held rateable in respect of it, if the value of the house was increased by the machine. But this was before the passing of the Act to which I have referred, so that it would be unsafe

to attach importance to the dictum, except in so far as it has been confirmed in subsequent cases.

The next case, the *Queen* v. *Guest,* requires our careful attention, because, as I have said, although it was decided before 1840, it was proved that personal property was not charged to the poor rate in the parish where it arose, so that it stands on the same footing as the cases after the passing of the Act. This circumstance appears to have been overlooked in the text books. The appellants were the lessees and occupiers of certain iron mines and of ironworks connected with them, where the machinery was situated which was the subject of dispute. There were blast furnaces, casting houses, foundry, blast engines, &c., but about them, as they were unquestionably fixed to the freehold, there appears to have been no question between the parties. There were also certain engines and machinery for which special foundations had been prepared, and to these wood and iron frames were secured, to which the machinery was attached by means of cotterels or keys and jibs in such a manner that it could be tightened or slackened or altogether removed at pleasure. The contention of the appellants was that the machinery was not so fixed to the freehold as to be regarded in law as real property rateable to the relief of the poor. On the other side it was contended that, if the article was practically connected with the land or building, and formed a part of the means of enjoying it, that would be sufficient. The principle, it was said, "is that where real property "derives an increased annual value from a personal "chattel annexed to it, the rate must be calculated on "such increased value."

In giving judgment Lord Denman said the true

principle was that "real property ought to be rated "according to its actual value, as combined with the "machinery attached to it, without considering whether "the machinery be real or personal property, so as to "be liable to distress or seizure under a *fieri facias*, or "whether it would descend to the heir or executor, or "belong, at the expiration of a lease, to landlord or "tenant." A great deal of comment was offered upon this case by Lord Esher in the *Tyne Boiler* case, for the purpose of showing that the word "attached" could not mean physically attached, so as to make physical annexation a condition of rateability.

It is unnecessary to discuss this point, as the law upon the subject is now clear, but it may be remarked that, in fact, all the articles in dispute were physically attached to the frames on which they stood, and these again to the buildings, whether for the purpose of steadying them and enabling them to be effectively worked, or otherwise, we are not informed. The important part of the judgment, for the present purpose, is that Lord Denman says that "real property ought to be "rated *according to its actual value, as combined with* "*the machinery attached to it*," drawing no distinction whatever between the method of valuing the building and the machinery, although the latter was not built into the walls or floors, but only secured to fixed frames, and was easily removable.

I should like to pause here and ask whether, after the delivery of that judgment, a valuer would have felt at liberty to assess the combined property by taking the building with its fixed furnaces and foundries in the usual way, and then adding only a nominal amount for the rest of the machinery, by way of "taking it into

"account"? The phrase is that the valuation must be of the real property "according to its actual value, as "combined with" the machinery—words which do seem to indicate that the process of valuing applied to the one ought to be applied to the other.

In the third of the group of cases to which I have referred, the *Queen* v. *The Southampton Dock Company*, the matter is viewed from another aspect. It was a case of the rating of the docks there, with their building and machinery, and the valuation had been made upon receipts and expenditure, so that the question was whether a percentage on the whole value of the machinery in dispute should be deducted on the ground of its being part of the tenant's capital. It consisted of cranes, steam engines, shears, derricks, dolphins, and other like ponderous machinery, all attached to the freehold and essential to the business of the company, which the company contended ought to be "taken into account" as being in the nature of stock-in-trade. Lord Campbell, in giving judgment, said: "This is a rate upon buildings "to which machinery is attached for the purpose of "trade, and it has been solemnly decided that such real "property ought to be assessed according to its existing "value as combined with the machinery, without con-"sidering whether the machinery be real or personal "property. It is of the greatest importance," he continued, "that a rule upon such a subject which has been "laid down and acted upon should be adhered to." The order of sessions was therefore confirmed, the effect being that the deduction was not allowed. As 25 per cent. was allowed for tenant's profits in that case, the result was that the assessment on the freehold was increased by 25 per cent. on the existing value of the machinery in dispute, less repairs. This was in effect

making the machinery rateable, and rateable to the full amount of its value.

This last case was decided in the year 1851; but, although the words of the judgment are clear enough, it would seem that it did not settle the practice, for we find Mr. Castle, senior, saying, in the first edition of his book, published in 1863, that the companies still contended that almost everything but buildings, line, rails, chairs, and sleepers had to be taken by the tenant, and ought to be rated accordingly. In 1860 came the *North Staffordshire* case, by which the judgment in the *Southampton* case was confirmed. That again was a question of allowing a deduction in respect of machinery and other matters as for tenant's capital, the articles in dispute being turntables, cranes, weighing machines, lathes, electric telegraph and apparatus, office and station furniture, and gasworks used for supplying the station with gas. There were certain electrifying machines and weighing machines which were not fixed to the freehold.

The well-known division of these articles into three classes was made by the Court: first, things movable, such as the furniture; then, things so attached to the freehold as to become part of it; and thirdly, things which, though capable of being removed, are yet so far attached as that it is intended that they shall remain permanently connected with the railway or the premises used with it, and remain permanent appendages to it as essential to its working. This classification has never since been disturbed, the definition as to the third class having been adopted in both the *Bishopwearmouth* and the *Tyne Boiler* cases. The first class were held not rateable, the second rateable, and the third to be governed by the *Southampton* case.

All this is familiar law, but what I am concerned to point out is that the effect of the decision, here as in the *Southampton* case, was to exclude the machinery in question from tenant's capital, and the percentage allowed upon its entire existing value would therefore be added to the amount at which the property was rateable.

Similar again is the well-known case of the *Queen* v. *Lee*, decided in 1866. That was an appeal as to the rating of gasworks, and the company claimed a deduction in favour of the tenant of 17½ per cent. on £200,000, £150,000 of which was in respect of the present value of meters, retorts, and fixtures and utensils. As you will remember, the deduction for meters was allowed, but nothing further. As to the meters, Cockburn, C. J., said: "I think that the counsel who have last addressed us "have entirely failed in showing that they are anything "more than common chattels." This remark is worth recollecting, in view of the fact that they were soldered to the service pipes. Of course they do not come within the definition of articles on the premises and permanently connected with them, as laid down in the *Tyne Boiler* case. But with reference even to articles on the premises, Mr. Justice Blackburn, in giving judgment, draws the distinction between things attached to the premises so as to become part of them, and things which, though fastened to them, still remain chattels; and he certainly does impliedly include among the latter not only mirrors and carpets, but some machinery, for he adopts for rating purposes the rule laid down in the case of *Hellawell* v. *Eastwood*, where it was held that cotton spinning machines, screwed to the floor of the mill where they were placed for working, were distrainable.

Reading his judgment, one might fairly come to the

conclusion that if a machine, though attached to the building where it is found as part of the plant, is attached for the enjoyment of the thing itself, that is to say, for its better working, it would not be rateable, and should not be taken into consideration by the rating valuer. And this, as you will remember, was the decision of the same court in the following year, in the case of the *Queen* v. *Halstead*, where machines for silk throwing, 30 or 40 feet long, and fastened to the floor for the purpose of steadying them, were held not rateable. When this last case was put prominently forward years afterwards in the *Tyne Boiler* case, the Master of the Rolls said he did not think it was a case of any importance, but in the *Bishopwearmouth* case Mr. Justice Lush said it was not intended to vary the rule laid down in the *Queen* v. *Lee*.

We now come to a parting of the ways. Up to this time there had been no distinction drawn between machinery which was to be taken as part of, or combined with, the freehold and that which was to be regarded as merely enhancing its value for rating purposes. There had been a classification in the terms I have quoted, but, as we have seen, if the Court held that the debated articles were rateable or the contrary, they were transferred bodily from one category to the other, and the premises as such were rated accordingly.

In *Chidley* v. *West Ham*, however, Mr. Justice Blackburn used an expression which, repeated as it has been in various subsequent cases, has given rise to the existing divergency of views among rating surveyors and text writers. The question there was as to the rating of certain tanks, mash tuns, and similar articles in a distillery; and Mr. Justice Blackburn, in giving judgment, said: "Whatever is fixed to the realty so as to pass

" as landlord's fixtures in a demise of the premises must " be taken to be part of the premises for the purpose of " ascertaining its rateable value. The question what " kind of fixture comes under this description is treated " at length in *Holland* v. *Hodgson*. I am not prepared " to say that the various articles described in the present " case may not be taken into account as enhancing the " value of the premises, but that question is not asked, " and we are only to say whether the things are rateable." He added that all the items in that case were nothing more than chattels which steadied themselves by their weight or with the slight assistance of a screw, and that they were not fixtures, and not rateable as part of the premises.

The question therefore arises whether in similar cases, though the disputed articles are not rateable *per se*, they ought not to be " taken into account " as enhancing the value of the premises, and, if so, on what principle. Now it is important to see what the things in dispute were in the *West Ham* case. As to the steam engines and boilers, with certain of the machinery, vessels, and apparatus, it was admitted by the appellants that they were fixtures, and were properly rated. But the following were contended not to be rateable: certain tanks forming the roofs of three houses, and resting on iron girders; some large wooden vessels called boiling backs, used for heating water for the mash tuns, standing on wooden girders and having fixed pipe connections; mash tuns standing on brick piers and having an agitating apparatus driven by steam, and also having pipe connections; a set of pumps worked by steam by means of a shaft or gearing, and other similar things.

As already stated, except where fastenings and

connections were mentioned, all the things in dispute were retained in their places by their own weight merely, and all of them were bought and sold as separate articles. Now it is not clear whether these things would have been held rateable under the previous decisions—I am inclined to think not. For it is to be remembered that, in all the previous cases but one, the articles in dispute were in fact attached to the freehold: I do not mean by pipe or similar connections, which Mr. Justice Blackburn says do not alter their character, but either directly or by means of being screwed to frames which were themselves fastened to the floors. The one excepted case was the *North Staffordshire*, where there were certain electrifying and weighing machines which were unattached. It is not quite clear from the judgment whether these were held rateable or not; but as "things "movable, such as office and station furniture," were held exempt, probably these were included in the exemption. It is perfectly clear that Mr. Justice Blackburn would have called them chattels, and he was a member of the Court by which the *North Staffordshire* case was decided. If that be so, we have here a distinction, observed at any rate down to the year 1874, when the *West Ham* case was decided, that machinery fixed to the freehold, so as, in intention and in fact, to form part of it, was held rateable, while machinery unfixed and movable was held not rateable, though in Mr. Justice Blackburn's view it might be taken into account as enhancing the value of the premises for rating purposes. And the fact that the latter had pipe connections, or was worked by gearing, or was fixed for the purpose of steadying it, made no difference.

The case of *Laing* v. *Bishopwearmouth*, which followed, was unsatisfactory in one respect, that

although the question was asked by the Court, upon what principle the machinery in dispute was to be rated, or valued, or taken into consideration, no direct answer was given. The judgment was brief, and stated that the law was settled by the leading cases I have referred to, and especially by the *Birmingham Gas Light* case and the *Queen* v. *Guest*, where (said the Court) it was held that in a rate upon buildings to which machinery is attached, the real property ought to be assessed according to its value as combined with the machinery. One main point insisted upon by the appellants was that a good deal of the machinery in dispute might be easily removed, but the Court said that did not matter. I think I am right in saying that all the machinery was either attached to the buildings or had special foundations adapted to it, and it was all of a heavy class. I am indebted to Messrs. Hedley for a full report of the case, the following extracts from which are instructive. Mr. Edwards, for the appellants, contended that being rateable and being taken into account as enhancing the value of the freehold were really synonymous terms, but Mr. Herschell, for the respondents, did not admit that, and said:

"The kitchen boiler in a house would be taken into "consideration as enhancing the value of the house. In "one of the cases where the room was used as a billiard "room, they held the billiard table was to be taken into "account.

"The LORD CHIEF JUSTICE: I think that doctrine "has been exploded.

"Mr. HERSCHELL: No, my Lord, I do not think it "has been overruled, and Mr. Justice Blackburn puts a "grate as a thing to be taken into consideration as "enhancing the value of the house.

"Mr. JUSTICE MELLOR: As long as the house has "that boiler in it that house has an enhanced value.

"THE LORD CHIEF JUSTICE: If you let your house "fitted up with these appliances, you get so much the "more for it than if you take them out, or let a tenant "come in without them.

"Mr. HERSCHELL: Yes, and the test is what are the "premises worth as they are, and therefore it is they are "to be taken into consideration.

"The LORD CHIEF JUSTICE: If anybody was going "into possession, they would either take these things or "not. If you take them away you reduce the letable "value of the premises; you cannot get so much for "them. If they are there, you get so much more. "Why? Because the premises are so much the more "valuable if they are there.

"Mr. HERSCHELL: And what would these premises "be let for as a shipbuilding yard?

"Mr. JUSTICE MELLOR: Take a canteen or a licensed "house—as long as the licence exists the house is of "some value, but if the licence is taken away what "value has the house?

"Mr. HERSCHELL: Or take this case—if you put "in a bay window, it is not rateable till it is put "in, but when it is in it enhances the value of the "house."

The illustration of the billiard table was beside the mark, as that is mere furniture, but in regard to the rest—the kitchen boiler, the grate, the bay window, and the licence—those are all cases in which the full value of the thing is added to the value of the naked building for the purpose of assessment. Without the kitchen boiler and the grates, a house would not be a dwelling house, and, with the exception of loose dog-grates, the latter

are always so attached to the building as practically to be part of it; the bay window is emphatically so. Then to say that, for things of this sort, only a nominal value ought to be added to the naked walls would be practically to say that you might do the same thing as to the chimneys or the glass in the windows. Of course, in the rapid interchange of question and answer which takes place in Court, it is not possible to be always logical, and after all, illustrations from fixtures in a house are likely to mislead where the subject of dispute is machinery; but if the idea was that things to be taken into account were radically different from things rateable, then the illustrations employed were unfortunate for the purpose.

The *Tyne Boiler* case, in the year 1886, as it went to the Court of Appeal, and was decided after a long and careful consideration of the arguments on either side, would be more important than any that preceded it, but for the circumstances that it did not purport to extend the principles already laid down, and that it scarcely touches the question as to the mode in which the machinery in question was to be taken into account. With reference to the things that were to be considered by the rating valuer, one might make the observation in passing that the case was said by the Court to apply only to machinery, not to furniture (that is to say, mere chattels), or even fixtures. Lord Esher said: "It only "applies to machinery which is affixed in some way or "other to premises for the purpose of business. . . . . "All I want to point out is that it does not apply to "fixtures generally—it applies to machinery used in "places of business and manufacture." I mention this because the definition afterwards formulated, if generally applied, is wide enough to include almost anything, and in a recent case it was quoted to prove that the show

cases in a museum ought to be included in some way in the assessment of the building.

It is scarcely necessary, since the *Tyne Boiler* case, to discuss what parts of the machinery in a shipbuilding yard or a factory have to be taken into account for rating purposes, but upon the equally important question as to how they are to be taken into account that case gives us very little light indeed. At an early stage of the discussion Lord Esher said, "You enhance the value "of the premises by taking into consideration that they "are used as a draper's establishment, but you do not "value the drapery."

Well, in the case of a draper's shop, all outside the stock in trade is either rated with the building as a shop suitable for selling drapery, or is goodwill. The goodwill is not here in question, because the mere presence of drapery goods in the shop does not create a goodwill; and the rest is included in the rent paid for the building, which of course is not rated as four walls, but as what it is. Later on in the argument, Sir Robert Reid suggested the case of the Doré Picture Gallery, and asked whether the value of the pictures was to be added to that of the building for rating purposes. Lord Esher said, "If you assume that picture-showing is a trade, I "think you will very likely make out that they are to "be taken into account."

"Sir R. REID: Picture-showing is most certainly "a lucrative business, and must be in that gallery.

"LORD ESHER: We do not consider the Royal "Academy as carrying on a trade."

Sir Robert Reid's argument was that the statute speaks of "hereditaments"—"make the thing out to "be a hereditament, or show circumstances by means "of which the hereditament is greater in value, as,

"for example, its proximity to a river or thorough-
"fare."

"LORD JUSTICE LOPES: Or take the case of a ferry:
"the tolls of a ferry *per se* are not rateable, but if there
"is occupation of land on either side it is rateable,
"enhanced by the tolls of the ferry."

This is evidently a better illustration, and is worth considering in this connection. In the *South Shields* ferry case Lord Campbell said: "When tolls are "attached to and appurtenant to manors or lands, they "are rateable as land; and where they really arise from "the use of lands, as in the case of canals, bridges, rail-"ways, or the pipes of water companies, though not "rateable *per se*, they may, after the proper deductions, "be treated as the direct profits of lands which are used "in, and are the real cause of the earning of the tolls." His lordship went on to say that this principle was not applicable to the ferry in question, as the tolls arose principally from the large capital employed in the boats, and the transit of the boats, not over the land in question, but over a tidal river. The value of this land should be taken, his lordship said, "not as the value of the land "merely, but as the value of the land as enhanced by "being available for the purpose of earning the tolls. "This," he added, "appears to be the true principle, "according to the test laid down in the Parochial "Assessment Act, as it would be the rent that could be "obtained and which the company would have to pay "for the land, for the purpose for which it is available "under the circumstances."

Applying this judgment to the particular case, the mode of rating the land would be, I suppose, by taking the gross receipts from the tolls, deducting the working expenses, then allowing a proper amount as a

return for the capital employed upon the boats and their transit, and adding the bulk of the rest to the naked value of the land on either side; since by taking the land the proposing tenant would be enabled to get this amount, and he would therefore give that amount as a rent for it, less some profit for his trouble.

But the analogy between ferry tolls and machinery for the purpose of rating fails in one respect, that in the one case the acquisition of the land is the means, and the sole means, of enabling the tenant to get the tolls; while the tenancy of the factory alone is certainly not the means of enabling the tenant to get the profits resulting from the working of the machinery in it. It is a step towards it, and that is all.

Nearly the same remarks apply to the illustration of the licensed house given by Lord Herschell. The only means of obtaining the monopoly of sale given by Acts of Parliament is to become the occupier of the premises to which the licence is attached, and hence it is that a much higher rent is given for them, including the full commercial value of the licence. Although the occupier is the person licensed, the real possessor of it is the owner of the house, and hence the tenant cannot complain if he must pay a substantial yearly sum to acquire it. That is undoubtedly a different state of things from a factory which may be put up anywhere, which is really only a shelter for the machinery, and for which the machinery is generally provided by the tenant.

Lord Justice Lopes also referred to the case of vats in a brewery; and Lord Esher said that if they were put in particular places in it, and the brewery could not be used without vats in those places, they would have to be taken into consideration. But as they

are some of the very things in dispute, the reference does not help us.

Now, in the *Tyne Boiler* case, it is to be noted that the rateable value of the premises had been calculated in the very way to raise the question we are now considering, if only that question had been asked in the special case, namely by ascertaining the rental which a tenant from year to year might reasonably be expected to give for the use of them, inclusive of the machinery and plant in dispute. Moreover, the Attorney-General (the present Lord Alverstone), appearing for the respondents in the case, when asked the question by the Court, said that in his view that was a correct statement of what ought to have been done. At the same time he contended that it was not an issue for the Court to decide, and they did not decide it.

Lord Esher, in the course of the case, gave one other illustration of what "taking into consideration" meant, as it then struck him. He said that when your house has to be valued for rating purposes, surveyors are called in, and they immediately ask you how much your house has cost, and a great many other questions which you cannot see can assist them to the real rent; and the answers to these questions they "take into consideration" in fixing the rent of the premises. True, but in such a case the surveyor knows what is wanted of him—it is the rent of the building as it is, that is to say what the hypothetical tenant would be likely to give for it; but in the case of the building containing machinery is he to find out the rent of the building and the machinery combined, or the rent of the building as it is with something added because the machinery is already there, but excluding the rent of the machinery itself?

Three years later there came another case which is

not so well known, because it was very imperfectly reported—*Gifford* v. *the Chard Union.* I am indebted to Mr. Walter Ryde for a transcript of the shorthand notes in the Divisional Court, but I have not been able to obtain a full report of the arguments and judgment in the Court of Appeal. The question was as to the rateability of certain bobbin net machines in a lace factory. The Sessions had reduced the rateable value of the whole premises to £895, being £295 in respect of the land, buildings, and fixed motive power, and £600 "the "amount by which the value of such land, buildings, and "fixed motive power was enhanced by the machinery in "dispute;" and they found that such sum of £895 was such rateable value, calculated upon the rent at which the premises, including the machinery, might be reasonably expected to let from year to year, less the usual deductions.

The appellants contended boldly that the bobbin net machinery ought not to be taken into consideration as enhancing the rateable value of the hereditament, but it is obvious that such a contention could not be supported in the face of the *Tyne Boiler* and other cases. They also contended that the extra rent which a tenant would pay, on account of its being there, was the sum by which it enhanced the value of the hereditament; but the explanation given by the Sessions of what they meant by enhancement was somewhat ambiguous. They said it was "the amount at which the premises would let to "a tenant from year to year as a going concern of a "lace factory, equipped with such machinery as was "essential to its user as such factory." Assuming that the word "equipped" means "fitted" or "provided" with, it may be taken perhaps as equivalent to the word "combined" used in the older cases.

But the building being so equipped, how is the equipment to be valued for rating purposes? In the Divisional Court Baron Huddleston answered the question by saying: "If these premises were enhanced in value, "they must be assessed, not by reference to the money "value of the machinery, but by the money value of "the machinery as connected with the hereditaments," and Mr. Justice Grantham gave judgment to a similar effect. In the Court of Appeal Lord Esher is reported to have said that the premises were to be rated upon what rent it might be considered a hypothetical tenant would give for them if devoted to the same purposes for which they were being used—a sentence which may mean almost anything in relation to the machinery. However, the effect of the judgment was to confirm an assessment in which the machinery figured for the substantial sum of £600, as against £295 for the buildings and fixed motive power.

The latest case dealing with this subject, which has gone up to the higher Courts, is that of *Kirby* v. *The Assessment Committee of the Hunslet Union,* decided last year. A number of manufacturers at Leeds had combined together for the purpose of testing the question referred to at the commencement of this Paper, but it happened somewhat unfortunately that the case eventually chosen for the purpose was that of a very small factory, where only some five hands were employed. I say unfortunately, because the figures involved were so small as to make the result more indistinct than it otherwise might have been. The rental of the premises was £28 a year, and the appeal was against an assessment of £67 gross and £45 rateable, the previous assessment having been £29 gross and £22 rateable. The valuers for the appellant took the land and buildings at £21,

including an enhancement for tenant's machinery, and the landlord's machinery at £4, total £25 nett. The respondents' valuers gave a total of £45 nett, including £20 for the enhancement by the presence of the tenant's machinery. The Recorder gave judgment in favour of the principle contended for by the respondents, but reduced the values, taking the land, buildings, and landlord's fixtures at £21, and adding: "To this has to be added "what a tenant would give by way of additional rent "for these premises, equipped as they are with the "machinery in them, including the right of user. This "I estimate roughly at £10 a year, making the net "rateable value £31." These are the figures, but when we come to inquire what the principle is which was so vindicated, we get somewhat into the clouds. In the first place it is said that it was not the contention that a percentage should be put upon the present value of the machinery, in order to ascertain the proximate rent that a tenant would be likely to give in addition to the rent of the buildings. But it seems to come uncommonly near that. In the course of the hearing the Recorder said:

"It comes back to this, does it not? You may say "that the rental value of machinery under different "circumstances may differ, but in asking for a rate "which is fixed upon the value of the use of the "machinery under given circumstances, you are surely "asking for a rate on the machinery.

"COUNSEL: It is difficult to distinguish in effect.

"The RECORDER: Yes, it is difficult to distinguish. "In the result you are putting a rateable value based on "the rent of the machinery,

"COUNSEL: And learned judges have recognised "that, and their own language has fallen into the same "confusion.

"The RECORDER: I do not say it is not legal, but I "only want to get what the result is.

"COUNSEL: It may be so. I am prepared to face "that. If that is so, I do not regard it as destroying "my argument in any way. It may be that it is "logically and theoretically equivalent, but whether it is "so or not, I am venturing to submit that it is the law; "and although put in one form it may be liable to "theoretical objection, put in another form it is not liable "to theoretical objection."

That is what is generally called a purely academic distinction. And is it not so as a matter of good sense? The valuer is told he is to find the additional rent which a tenant would pay for the use of the machinery connected with the building as a going concern. If he were told to find the rent a tenant would pay for the use of a house, he would know how to go about it at once. If it were a house like others in the neighbourhood, he would be guided by the current rents of the others; if there was no similar building, and the occupier were the owner, he would put an estimate on its capital value, and take a reasonable percentage upon it.

The Courts have been thought to say this is not to be done in the case of machinery, but what other rule can be followed in practice? Would a landlord be likely to provide machinery on any other terms? In the open market would a tenant be likely to offer less than would represent such a return of value? And whether the landlord or the tenant provides the machinery of course makes no difference for the purpose of rating. It is said that some machinery is old, and perhaps partly obsolete. Well, all that has of course to be allowed for, just the same as in the case of houses. Cost is not the guide in the one case more than

the other; but taking the value of the machinery as it stands, used for the purpose for which it is used, is not that the best guide to its rental value?

That is to say unless the Courts are willing to take the view of the rival school, who consider that a nominal value, based on the convenience of having the machinery *in situ*, and the building adapted to it, is all that ought to be assessed. But I think it is fairly clear that the Courts are not willing to adopt this view, though they will not say in specific terms what other view they take.

In *Kirby's* case the Recorder would not adopt the £20 given by the respondents as representing the value of the machinery, but halved it; but in the rider finally explaining his judgment he said: "I held that in "inquiring what was the gross estimated rental and the "rateable value, the basis of the problem was to ascer- "tain what was the rent which a hypothetical tenant "would give for the engineering works as a combination "of land, buildings, and scheduled machines on a demise "which included the right to use the scheduled machines, "that is to say on the assumption that the hypothetical "tenant would get as part of the consideration for his "hypothetical rent the right to use such machines upon "the premises during his tenancy, and that in this way "the scheduled machines were being properly taken into "account as enhancing the rental and rateable value of "the freehold. I also hold that the value of the user of "the machinery was not necessarily to be arrived at by "taking the cost or value of the machinery and putting "a percentage on such value, as had been done by the "respondents' valuers." "Not necessarily," of course, but as the most obvious way, I suggest, in the majority of cases.

The Lord Chief Justice, in holding that the Recorder was right in his decision, said he had merely regarded the presence of the machinery and its value as an element which would lead a tenant to pay more for the combined rateable value—that is to say, as I understand, not taking its value alone as his guide, but that with all the other circumstances of the case. But the Recorder did undoubtedly take the value of the user of the machinery as representing its rent, and that is something tangible, which there is not much difficulty in getting at. The naked words of the judgment of the Divisional Court would seem to leave the whole matter to the discretion of the valuer, but the affirmance of the Recorder's decision must be taken as an affirmance of the principle he adopted.

In the Court of Appeal *Kirby's* case was fully argued for the appellant, but the respondents' counsel was not called upon, the Court holding that they were bound by the *Tyne Boiler* case, though Lord Justice Romer said that for himself he could not properly appreciate the reasoning in that case. In the House of Lords, Lord Halsbury said: "The overseer has a comparatively simple "problem to solve, although it is difficult enough some- "times; he sees the place being conducted as a brewery "or an iron foundry, or what not; he looks at the "premises, he looks at the furniture which is necessary "for carrying on the business as a brewery or foundry ". . . . and he says to himself, 'Well, looking at the "whole of the place, such and such is the rent that "would probably be paid by a tenant from year to year "for such an establishment as this.'" This is saying in simpler words pretty much what the Recorder had said in his rider. It is a question of the *rent* which the

hypothetical tenant would give for the combination of land, buildings, and machines.

So much for the question with which we set out. There are others of still larger import in connection with the rating of machinery, which we have not time now to discuss. As a whole, it is almost impossible for any impost to be in a more unsatisfactory position. It is not only levied with uncertainty where the law purports to be carried out, but, owing to the tendency of the impost to put a fetter upon industry, there is, in many localities, the strongest reluctance to levy it at all, amounting in a large number of instances to a positive refusal. Hence the practice as to the rating of machinery in different places is of the most divergent kind. In one London borough the law is strictly carried out, and the machinery within it is rated to the full, indirectly of course; while in the borough immediately adjoining only the heavy machinery permanently fixed to the freehold is taken any cognisance of: and the same irregularities prevail in other parts of the country.

The way in which these inequalities work out is shown by the position in one of our midland towns, where the machinery was rated up to the hilt a few years ago on a re-valuation being made. From that, among other causes, a number of factories there are now empty. Meanwhile in another town some thirty miles distant, and where the same staple industry is carried on, no similar step has been taken, and the manufacturers there get an unfair advantage. The corporation at the former town are now extremely desirous of getting some new branch of manufacture brought to the place, and are even willing, if they have the power, to give a substantial bonus for the purpose.

It is manifest that such a state of things cannot last.

Where local authorities are afraid to carry out the law, owing to the apprehended result to the industrial community, some change in the law is inevitable, and I think we shall all wish that such a change may take place as will make its administration clear and its operation fair and equal.

Mr. E. J. CASTLE, K.C. (Associate), said he rose, with great pleasure, to propose a vote of thanks to his old friend Mr. Marshall for the able and comprehensive Paper in which he had collected, he believed, all the cases—except one—which bore upon the subject, to which he had added a valuable synopsis of the law as laid down by the Courts. The dicta of the judges had been reported from time to time, and rating surveyors had referred to the law reports and selected the decision which best bore out their own case, like a man who, going into an armoury, took the weapon that pleased him best and then went with a light heart to the fray.

The whole question of rating was not a matter of law, but it seemed to him to be one of fact, and so complicated in its incidents that it was almost impossible to give a clear "aye" or "no" to any particular proposition laid down.

Even when this was possible, judges had, he thought, sometimes made mistakes which had been adopted as precedents, and confirmed by constant repetition for a number of years, until, perhaps, some brilliant genius discovered the fallacy, and the matter was set right.

One question running through Mr. Marshall's Paper was whether machinery was rateable *per se*. Now that was, in his opinion, a heresy—the very suggestion was heretical.

Nothing physical was rateable, neither house, nor land, nor property of any kind was rateable, because the law laid it down very clearly, under the statute of Elizabeth, that the rates were a personal tax charged on the occupier. It was he, as the occupier of certain property in a parish, who was rated, and not his property, Therefore to speak of property being rated *per se* led one astray from the real issue. This looseness of expression arose, he took it, in this way. From about 1790 down to 1820 the question arose whether tolls were rateable. The Courts said that tolls were rateable property and rateable *per se*; and thus it was said, logically following out the idea, that tolls were rateable where collected. But suddenly the Courts awoke to the fact that tolls were not rateable *per se*; and in 1831, if he remembered rightly, they undid all they had done before and special clauses were put into the Canal Acts which made them, in some cases, not rateable at all.

The question was, therefore, not whether machinery was rateable, but whether the man occupying the house was rateable from the fact that his house was supplied with machinery.

A man was rateable in proportion to the rent he paid for the house, and then arose the question, what did the house include? The statute of Elizabeth said that the occupier of the house and land was rateable. Did a house include what ordinarily passed with a house; such things, for instance, as the chimneys, chimney-pieces, and grates? There had been a kind of progressive movement in the relations between landlord and tenant, as more and more conveniences had been added to houses. He remembered, as a boy, going over the Pavilion at Brighton after the late Queen came to the throne, and the place was sold to the Brighton

Corporation. In that case all the grates were torn out of their places because they did not go with the house. Gas fittings and such things were, in former days, supplied not by the landlord, but by the tenant and were regarded as tenant's fixtures. Now the question arose in dealing with ordinary houses, what was supplied by the landlord, and this was a question of fact and not of law. When the case of *Chidley* v. *West Ham* came before Mr. Justice Blackburn, it was asked whether certain tanks and other articles in a distillery were rateable *per se*, and it was decided that certain things were not rateable *per se*, because they were sold in the market and therefore must not be taken account of.

But, he would ask, what was a brick before it was built into a wall? It was merely a chattel, bought and sold in the market. If one reckoned so many rods of brickwork, at such a price per rod, and put a percentage on it, was that rating the bricks *per se?* That was, of course, absurd. One must find out, as between the landlord and tenant, what the one would give and the other would take. The landlord wanted his percentage on capital outlay. But Mr. Justice Blackburn had laid it down—and his words had been treated as if they were biblical—"Machinery of that kind is sold and "bought in the market and is not rateable *per se*." He feared that *Chidley* v. *West Ham* showed the absurdity of a man travelling outside his own knowledge. In that case a tank covered the roof of three buildings, forming a water tower with a tank on the top of it, and possibly a roof over. The tank was as much part of the tower as the bricks were, but it was held that it was not rateable *per se*, because it was a thing which could be bought and sold in the market. It seemed to him there was no use in arguing about such a decision. It

was wrong, and he did not hesitate to say so. He had the greatest respect for Mr. Justice Blackburn's memory, but he thought the only way was to face the matter boldly, and to say the decision was wrong. It was simply impossible to argue that such a tank or such a water tower was not rateable. The whole formed one entire structure, and the only question was, what would a tenant be likely to give for it.

It seemed to him that when a difficulty arose about rating, it was well to go back to the two good old statutes, one the statute of Queen Elizabeth, which said that the occupier of the house was to be rated, and the other, the statute of William IV. which said the rate was to be proportionate to the rent for which the premises might be expected to let. If machinery were not part of the house, it could not be taken into account, but if it were, it must be considered.

It was, of course, possible to argue one way or the other. If he were instructed as counsel by one side, he should argue one way, and if by the other, he should do his best to convince the tribunal on their behalf, but in his heart of hearts he believed that the whole question was simply what was included in a house.

It was said by Mr. Marshall that the material point was whether the law should include in the house anything but the walls, floors, roof, staircases, and such things, and whether machinery put into a house should be excluded. The money must be collected from some source, but to put a tax on manufacturing machinery was to tax the producing power of the country, which he thought a very foolish thing to do. But if the law said it should be done, it must be done. Another anomaly was contained in the phrase "attached to the "premises." People talked of "attached" as if it

meant nailed down. One nailed down a carpet, while the hearth-rug lay by its own weight; but was there any real distinction between the two? The carpet was furniture, and yet it was nailed down, and the hearth-rug was furniture, although not nailed down. Looking-glasses or pictures were all nailed, but not "attached," while a door-key was attached to a house, and, although entirely separate from it physically, was handed over on change of tenancy as being part of the house. Loose shop shutters, which were daily put up and taken down, were part of the house and yet not physically attached to it.

Take another illustration as showing the difficulty of dealing with the matter: Was a travelling crane on the side of a wharf at Newhaven, for instance, attached to the wharf or not? If a travelling crane became a locomotive, and went, not only on the wharf at Newhaven, but ran up to London, nobody could say it was attached to that wharf; but what would be said to a travelling crane on a gantry, which travelled overhead but never moved away from the works. Who was to decide?

Mr. G. HUMPHREYS DAVIES (Fellow) said the Members present would, he was sure, agree with him that they were all indebted to Mr. Marshall for his interesting endeavour to make clear the difficulties with which the Courts had surrounded this question. Having spent a considerable number of years in the work, he was bound to admit that he really did not know what was exactly the present position. He had thought he understood, until some very recent decisions had been given, what the law meant was to be done, and if only the

Courts would lay this down in plain language he thought most surveyors could fairly well carry it out. The present difficulty was that no one knew what he was required to do—at least that was the view he took of it.

The heading of Mr. Marshall's Paper was "The "Valuation of Machinery for Rating Purposes." But what was "machinery"? The judges seemed to have thought that "machinery" was a word of exact definition. Having a rather wide experience of machines of various sorts, he had come to the conclusion that it was a word that conveyed, to practical men, no definite meaning. A typewriting apparatus was a machine, and so was a sewing machine, or a locomotive, or a steam hammer, and to use the word "machinery" loosely seemed to him merely to confuse the issue. As Mr. Castle had said, it was, to a great extent, a matter of fact, and it was useless for a judge to sit in Court to talk of a thing he had never seen, in order to decide whether it was rateable. It was only by looking at it that one could decide, first of all, whether it ought to be rated or not, and then what its rateable value was.

There was one point upon which, with great deference, he joined issue with Mr. Marshall, and that was about the case of the *Queen* v. *Guest*. If his memory served him that was a case of iron mines, and he fancied there was some little confusion about the case, because at that time (1840) mines were distinguished from quarries for the purpose of rating, because, upon the principle that the mention of one excluded all others, the mention of coal mines in the Act of Elizabeth was held to exclude every other mine. But quarries did not come within that exemption (it was a very fine distinction), and so were rateable. The question in *Guest's* case was, he thought, not so much whether loose

machinery or chattels were rateable, but whether the pit head gear, as forming part of the mine, was exempt from rating. It was held to be a thing capable of separate occupation and therefore to be rated, but he did not think in that case—with great deference to Mr. Marshall—there was any question about such things as one had to do with to-day in a great many places, things like lathes or sewing machines, which were certainly of a different character for rating purposes.

As Mr. Castle had said, Lord Blackburn endeavoured to distinguish between what was to be rated and what was not; and when such nice questions arose, as in that of the travelling crane, Lord Blackburn said that what one must look at was the intention with which the thing was put into its place. Obviously, when putting up a pier glass, a man nailed it to the wall in order that it should not fall down on his head and break, and that he might more conveniently use it. He certainly did not nail it up with the intention of making it the property of the landlord.

It was held by Lord Blackburn that the anchor of a ship was not rateable, but that the anchor of a suspension bridge was, for it was permanently placed in position and became part of the freehold by intention. A similar illustration was the case of a dry stone wall in Devonshire or in Ireland, and stone in a mason's yard. The stone in the one case was rateable, though it was not fixed, and in the other it was not, because it was stock-in-trade.

In 1840 the Act was passed which seemed now to be questioned, as everything was that one used to rely upon. It had lately been doubted whether the Act of 1840 did decide that personal property was not rateable. He should have thought the thing was not open to discussion

if one read the history of rating from the 16th century; but it seemed to him that if, under that Act, personal property was not exempt, then the whole question was thrown back to 1836, when all personal property was rateable, and in many places was actually rated.

As to the construction to be put on the recent case of *Kirby* v. *The Hunslet Union*, he could not quite agree with Mr. Marshall that it was too small a case to decide the law. He thought it should have brought out the point that was to be argued, and it was now said to be a decision that a lathe, driven by the feet and not by steam power, was practically to be rated as part of the premises. If that were so, then we must go back to the conditions of 1836, when the case of *R.* v. *Lumsdaine* was decided, and rate all personal property. The original Act of Elizabeth referred to land and houses. The words "machinery" and "manufacturers" were not even mentioned, but simply the occupier of the house or land.

If a chattel like a foot lathe, which was the furniture of the house as much as a bed was in a dwelling house, had to be rated, then the only logical conclusion was that a bed should also be rated, and indeed everything else in the building. There could not be one law for one person and a different law for another. Something had been said, he thought, in the course of this case about the word "inhabitant" in the Act of 1840, but he thought that the word was only inserted to more clearly explain the Act of Elizabeth, for a reference to the older Act would show that both "inhabitant" and "occupier" were mentioned, the object being, obviously, to include a man who was not an "inhabitant" but yet occupied land in the parish. It seemed to him that was the reason for the use of the word "inhabitant" in the Act of 1840. So that,

whether an occupier were an "inhabitant" of a parish or not, he was to be exempted as regarded his stock-in-trade and personal property.

Another set of anomalous cases must be also considered in connection with this matter, for if the machinery were rateable in the *Hunslet* case, this upset the decision in the *Staley* v. *Castleton* case. In that case a man had a mill, which he could not use because he was unable to get cotton owing to the American Civil War then raging. The spinning machinery was standing waiting for better times, and, of course, the mill was unsaleable and unlettable. The parish rated it, contending that the mill was to be rated as a going concern, but the Court held that a thing could not be a warehouse for itself, and that the mill was a warehouse for cotton machinery. If under the *Hunslet* decision, machinery was to be rateable, then the case of *Staley* v. *Castleton* and other cases would go, and the owner would be entitled to entire exemption.

Although he took a warm interest in this subject, he did not want to let his zeal for the views he held lead him to forget that time was limited, and although there were many other points requiring notice, he would not attempt to deal with them on that occasion.

Of course, the question, as Mr. Marshall said, was a very serious one for the country. It was one of policy which ought to be very carefully considered by the Legislature. The amount of money that turned on the question was, of course, very large, for if the whole of the machinery in the country were to be rated in the way contended for by some, it would produce many millions a year, and those affected would make a great effort to resist such an impost.

He was strongly of opinion that the law ought to be cleared up on that point. He had drafted a Bill which had been read in the House for, he thought, some 12 years, but it had never got beyond its second reading, owing to the difficulties which presented themselves in the case of a private member's Bill. He thought it contained a very clear statement of what should be done, and what he believed the law originally intended should be done. Without being accused of self-laudation, he might say in favour of his draftsmanship, that the Royal Commission on Taxation reported in favour of its enactment. In 1902, the House, thinking, he supposed, that it was a question which ought to be settled, and settled in the way he suggested, passed, for Scotland, an Act which exempted in the clearest terms every piece of machinery except motive power. It provided that machinery, which could be removed from a building without injury to the building, should not be rated. He had never gone so far as that in his claim for English manufacturers, but it certainly could not be for the good of the country, or to the credit of the surveyor's profession, that the law should remain in the confused state which Mr. Marshall had so graphically pointed out.

Mr. E. J. HARPER (Fellow) said he must confess to some slight disappointment that his friend Mr. Humphreys Davies should have resumed his seat without having given what he fully expected to hear from him, namely, a defence of the principles underlying the exemption of machinery from rateability.

Whatever diversity of opinion there might be about the question itself and the various difficulties arising from it, he was sure there could be but one feeling as to the indebtedness of Members to the learned counsel who had been good enough to spare the time necessary to put together such a Paper as Mr. Marshall's. The Paper seemed to him to focus the lines along which the different decisions had been given, and carried the question some way on the road to the discovery of a guiding principle running through them all.

He found some rays of light penetrating his mind during Mr. Castle's lucid speech, and his disappointment was great when Mr. Humphreys Davies rose to say that, after all, he did not know what one had to do when valuing hereditaments containing machinery, although this statement was modified by his saying, later on, that a few years back, he did know, and it was only recent decisions which had confused him. He confessed that some similar confusion existed in his own mind.

Recent decisions had been extremely puzzling, but did not the root of the difficulty lie in the use of those attractive, but very dangerous words, "enhancement of "value"? Take, for example, a carpet or the rest of the furniture in a house. They undoubtedly enhanced the value of the house. One had only to let a furnished house and to let the same house unfurnished to know that. It was an absolute fact not to be got away from; but would it ever be said that, because furniture enhanced the value of the house, that it was, therefore, rateable, or even to be taken into consideration in fixing the assessment? Of course not. The fact was that, in the ordinary way, houses were let unfurnished, and the test laid down by the law was what rent a tenant might

be reasonably expected to pay, in the ordinary way, for an ordinary hereditament.

If it were not for the extraordinary cases brought forward, it might be safe to found one's views on what seemed to be the only rock bottom, namely, what was ordinarily provided by the owner and what was ordinarily provided by the tenant. Applying that test, everyone had come to the conclusion that the furniture in a house was not rateable. Carrying the analogy on to the case of machinery, the question seemed to resolve itself into this: what machinery was usually and properly provided by the owner, and what machinery was usually provided by the tenant? He was sure that Mr. Humphreys Davies could give a dozen instances, if he were asked, where that abstract proposition could be turned into a very difficult and brain-splitting one.

There was nothing like pegging away for getting anomalies removed, and it seemed to him that such a Paper as Mr. Marshall's, followed by such a discussion as he hoped it would elicit in that room, was likely to be of extreme value to the profession as a whole, though it might not be possible to arrive at once at any final definition to which everybody would subscribe.

He would venture, though it might seem too daring on the part of a surveyor to intervene between two gentlemen learned in the law, to suggest that Mr. Marshall, in using the words "rateable *per se*," attached a meaning to them different from Mr. Castle's It was true that no kind of machinery was rateable in the sense that it ever became liable to a charge, but, as all knew, the word "rateable" had come to be used in a wider sense than formerly, as meaning "assessable" or "liable to be "assessed." That was what he believed Mr. Marshall meant when he used the word "rateable," and indeed

what was generally meant; and it was obviously correct, for the law compelled the valuation of all hereditaments, whether the occupier was to be rated afterwards or not. Therefore Mr. Castle's point, though academically correct, had, he thought, only a limited application.

He should like, if he were not travelling outside the scope of the discussion, to mention a matter which affected those engaged in rating in London. He referred to the question of deductions, which was not so difficult in the provinces, because there was not the scale of deductions that appeared in the Valuation Act of 1869. By that Act occupiers of mills and manufactories obtained the maximum deduction of one-third. An owner might have a warehouse without machinery and let it at a rack rent, which would be the true rateable value; but if the tenant wanted to use a little machinery and put in a small gas engine and shafting, and so brought it within class 8, the value added would be trifling, but he would get the full one-third deduction, although he had only expended some hundreds in adding machinery. This would have the effect of reducing the rateable value and constituted a danger to which he thought attention should be called. It was true that at the head of the scale of deductions there appeared the word "maximum," but, unfortunately, assessment committees generally used the scale as it stood, and it was difficult to get them to depart from it unless there were a very strong case indeed.

Mr. E. M. KONSTAM (Visitor) said he should like to add a few words to the discussion on the effect of the

recent decision in *Kirby* v. *Hunslet Union*. He did not think surveyors need be too anxiously concerned with the phrase "enhancement of value," for they had the authority of Lord Halsbury, the ex-Lord Chancellor, for saying that the phrase was nonsense. He said he would have nothing to do with it, and after once almost lapsing into its use, he said plainly that he meant the machinery must be rated. The law, as it stood for 20 years after the *Tyne Boiler* case, was perhaps most thoroughly stated by Mr. Foote, Recorder of Exeter, in his judgment in a case of some newspaper printing works. The Recorder carefully reviewed all the cases and the usual question was raised whether the percentage was to be put on the full value of machines or not. He came to the conclusion that the machinery there was admittedly not a part of the freehold, and was to be taken into account only to this extent—that the mind of the tenant would be influenced by the fact that he would not have to go to the expense of buying it elsewhere and bringing it to the place, and that it was worth his while to give £3 or £4 more for it to save that expense, but he declined to put any value on the use of the machinery itself. That was practically the basis on which Mr. Justice Channell went in *Crockett* v. *Northampton*, only that there he referred to blinds and other fixtures in an unfurnished house.

But that state of the law had, he believed, now been cleared away, and one started with a "clean slate," if he might use the expression. The *Kirby* v. *Hunslet* case was referred to as a small case, and certainly was so. The figures were close together, and the Recorder took a medium course between the amounts put forward by the parties, which brought his figures closer still to those

contended for by the appellants. That had the somewhat unfortunate result of confusing the issue in the Divisional Court. He heard the arguments and he thought the Court did not quite appreciate the difference between the parties on account of the figures being so close together, but the case had been selected because none of the machinery—and that was an important point—was attached to the freehold except, perhaps, by the flimsiest attachment, and there was no question as to whether it should be rated as part of the hereditament.

When the case came before the Appeal Court, Lord Justice Romer said it was impossible for him to follow the reasoning in the *Tyne Boiler* case. The Master of the Rolls practically said he did not altogether agree with it, but the statutes seemed to have undergone some process of evolution, and Lord Justice Mathew agreed with it, he being one of the Judges who decided it in the first instance. When Lord Halsbury said he would not have anything to do with "enhancement of value" he proceeded, so to speak, "to pull up the flood gates "and let in the sea." He thought he was influenced by the case of *Staley* v. *Castleton*. He said in effect: "We "will not trouble ourselves with hypotheses. The "overseer has to come in and rate what he sees." Lord Halsbury spoke throughout his judgment as if the overseer coming in to rate the property were some amateur or bucolic individual casually called upon to rate a factory, which had been put down in his parish. He hardly thought that was a usual state of things where a factory came to be valued; but the idea seemed to be that the lawyers were trying their utmost to make the amateur valuer's task doubly difficult.

His Lordship went on to say that the overseer, in

rating a factory, had nothing to do with hypotheses, which were no part of the business of ordinary life. That, he ventured to say, was not the case. In the letting of hereditaments, one was concerned with nothing but hypotheses. It was a rare case for a man to go and view a house in the absolute state in which he was going to take it. He might go into two houses, and see one nicely furnished, and another not so well furnished, but he made up his mind as to what he was willing to give for either of them without those accessories. Experience taught that a house well decorated would probably let better than one in want of repair, or less well kept, but any estimate of its vacant value must be pure hypothesis. Then Lord Halsbury went further, and directly contradicted what was always thought to be the law, that one must take into account what would pass with the hereditament and what it would be ordinarily let at. He said: "No, "we have nothing to do with that, this overseer has to "come in and rate the factory as he sees it working, not "only with every machine, but every tool or cart on the "premises. There is to be no hypothesis, he must come "in and put down all he sees." He did not think that was an exaggerated statement of Lord Halsbury's judgment. It seemed to him that the principle there laid down was so very wide that it would probably never be followed to a logical conclusion.

Mr. W. PERCY PAYNE (Professional Associate) said that at that late hour, and in view of the number of Members who would be anxious to take part in the debate on Mr. Marshall's able and important Paper, he

begged leave to move the adjournment of the discussion to the next Ordinary General Meeting to be held on February 12th.

The vote of thanks having been put and carried unanimously, and Mr. Payne's motion having been agreed to, the Meeting then adjourned.

No. 493.

AT

## THE ORDINARY GENERAL MEETING,

*Held on Monday, February 12th,* 1906.

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CHARLES BIDWELL (President) in the Chair.

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The discussion on the Paper read by Frederick Marshall, K.C. (Associate), at the Ordinary General Meeting of Monday, 29th January, 1906, entitled "The "Valuation of Machinery for Rating Purposes," was resumed by

Mr. W. PERCY PAYNE (Professional Associate), who pleading a severe cold as an excuse for making his remarks very brief, said he was sure The Institution was greatly indebted to Mr. Marshall for his Paper, which had so well shown the reasons for, and the extent of, the difficulty which surveyors experienced in carrying out the law as determined by the judges in cases of the rating of machinery. From the time of *Queen* v. *Guest* down to *Kirby* v. *The Hunslet Union*, the decisions had been more and more mystifying. What surveyors required was that the judges should tell them the meaning of the words "enhancement of value" and how they were to measure that enhancement. The present system of rating machinery worked very unfairly throughout the whole of the country. In some localities everything was valued, and in other towns nothing

whatever was taken into account. He might mention, as an instance, the well-known case to which Mr. Marshall had referred, *Gifford* v. *The Chard Union*, which turned on the rating of a lace factory, the building being assessed at less than £300, while the machinery in it was rated at something like £600.

The city of Nottingham, where he lived, was full of lace factories and lace machinery, but not one single machine was assessed. A lace maker at Chard must add to the cost of his goods a proportion for rates and taxes on his machinery, while the Nottingham manufacturer paid nothing on that account.

He thought that the judgment in *Kirby* v. *The Hunslet Union*, if it meant anything (he wished to speak with all respect), was at least very difficult to understand. He, for one, quite failed to comprehend it. It seemed to him, if he read it aright, that its result would be that every chattel used in a factory or works must be taken into account as enhancing the rateable value of the building, which was to be regarded as a mere shell containing it. He earnestly hoped that he might live to see some Act passed or some rule laid down making it possible to carry out the work in the spirit of what now seemed contradictory and perplexing decisions.

Mr. W. B. BRODRICK (Visitor) said it seemed to him that the present state of the law on the valuation of machinery for rating purposes was due, not so much to what one might call natural evolution, as to dire necessity. The question of the rating of machinery had been brought into prominence, during the last 15 or 20 years, almost entirely by the necessity felt by the various local bodies throughout the country for raising the amounts required to meet their yearly increasing

expenditure. The Assessment Committees, or the bodies behind them, had endeavoured by every means to discover new sources of revenue in order to make the pressure on the individual ratepayer less apparent. That was in all probability the principal reason why the rating of machinery had been brought into such prominence in recent years. The question whether the local authorities ought to incur such increased liabilities was a large one, and was quite outside the scope of the present discussion, but the fact was patent that expenditure had risen, and was rising, and that to meet it new sources of revenue were being eagerly sought.

It might be considered rank heresy, on the part of a junior member of that profession which Mr. Castle and Mr. Marshall adorned, to question any decision of the ultimate Court of Appeal—the House of Lords—but he still ventured to doubt the correctness of the decision, given on the 19th December last, in the case of *Kirby* v. *The Hunslet Union*,

In his Paper, Mr. Marshall had very ably reviewed all the cases from 1840 onwards, which dealt with the question of the valuation of machinery for rating purposes, but if he wanted to justify his doubts as to the correctness of the Hunslet decision, he would do so without reference to any cases at all, but simply by reference to the Statute Book. There were two Acts of Parliament, to which Mr. Castle had referred and on which hung, practically, the whole law of rating, namely, the Act of Elizabeth and the Act of William IV. It had become the practice, previous to 1840, in some localities to rate personal property; but in that year an Act was passed, which had been continued year by year and was still the law, exempting personal property from liability to assessment. Since 1840, when that Act was passed, the

majority of cases that Mr. Marshall had cited had been fought round, what he might call, the intermediate class of the three into which machinery had been divided. The first, namely, machinery which was built into part of the freehold, was, no doubt, liable to be rated as being part of the hereditament. The class in which the machinery was unquestionably in the nature of chattels involved little difficulty, for there was never any doubt that it was not to be rated; but there was the intermediate class of machinery, which was either attached to the hereditament only for the purpose of steadying, or was of such weight, or was so secured by bolts, that it was not easily movable, but yet might be removed without damage to the structure. It was round this class that the battle had been waged from 1840 until the date of the decision in the *Tyne Boiler* case.

He thought he was right in saying that up to that time there had not been a case since 1840 where a pure chattel had ever been held liable to be rated. Previous decisions were somewhat conflicting, the reason possibly being that the facts of the various cases differed widely, or, as he thought was more probable, that they had been presented to the Court in very different ways. It depended entirely upon the way in which a case was stated whether certain points, which one wished to have brought out and decided would be made sufficiently obvious and prominent—would in fact be so stated as to elicit a direct decision upon them.

Since the decision of the *Tyne Boiler* case he was afraid that the work of Assessment Committees, and their surveyors and valuers, had been greatly increased in consequence of what he might almost call—with great respect to the memory of the late Lord Esher—the indefinite and confusing language he allowed himself to make use of in

that particular judgment. He did not see how a valuer could do justice to himself if he proposed to act in accordance with that decision, or how he was to add any value to premises containing machinery, because they contained machinery which enhanced their value, without putting some value on the machinery itself.

In that case, if he remembered rightly, Lord Esher said the machinery itself was not to be rated—it was not rateable *per se*; but the mere fact of its presence on the premises must be taken into account as enhancing the value of those premises for the purpose of assessing them to the poor rate. He believed that, in that case, everything found on the premises was taken at a lump sum, and that even an innocent grind-stone was included, although it would appear to be a mere chattel.

Since that case it had been the custom, in many cases, for valuers and surveyors to rate things which were undoubtedly chattels; and now, if he correctly understood the judgment of Lord Halsbury, everything found in a factory in the way of machinery might, and should, be rated. The ex-Lord Chancellor objected to the language used by Lord Esher in the *Tyne Boiler* case which he said was misleading, as it undoubtedly was. He would not talk about taking into account as enhancing the value, but the result of the judgment was that any surveyor or valuer, when valuing a factory containing machinery, must actually take into account all machinery found there, although, as a matter of fact, it might not be attached to the freehold. As he had said, so far as he could venture to question the correctness of that decision, he based his opinion entirely on the Acts of Elizabeth and William IV., and the Act of 1840 which exempted personal property from liability to assessment.

There was no doubt that a great deal of the machinery in the *Kirby* v. *Hunslet Union* case was personal property—mere chattels—which the House of Lords had decided it was correct to rate. This appeared to him to be in direct conflict with the Act of 1840, and the only way he could see out of this chaos was that an Act of Parliament should be passed, such as that which the Machinery Users Association had promoted for the last 12 years without success, which would at any rate remove many of the difficulties which beset valuers, and, if it did not clear up everything, would make it easier for them to do justice to themselves, to those who employed them, and to the ratepayers, when premises containing machinery had to be assessed.

Mr ERNEST PAGE, K.C. (Associate), said he should like first to express his appreciation of the way in which his friend Mr. Marshall had endeavoured to unravel the tangled skein of the various judicial decisions. That he had not been able to do so was due to no want of ability or of industry, for there could be no doubt that the condition of the law with regard to the rating of machinery was at the present moment absolutely unsatisfactory. No good could be done by criticising the decisions of the final Court of Appeal.

If the Divisional Court or the Court known as the Court of Appeal had pronounced judgment in the *Hunslet* case, in exactly the same terms as those used by the ex-Lord Chancellor in the House of Lords, one would have been inclined to doubt the soundness of the judgment, and to advise an appeal to a higher Court, thankful that there was a higher Court to go to; but now that the House of Lords had decided the matter, it must be taken by all loyal subjects that they had correctly interpreted the intention of the legislature and

had laid down, not any new law, but the law for all time with regard to this question. In these circumstances it was not permissible to hope for any fresh judicial determination, in however unsatisfactory a condition the matter was at present left.

With regard to the rating of what might be called the heavier kind of chattel machinery, the Assessment Committee, or the tribunal to whom the matter was referred for decision, might do almost anything. They might take a percentage of the whole capital value of the machinery and call that the amount of the enhancement, thus practically rating the machinery. On the other hand, they might say that the amount of enhancement was so small as practically to be negligible. The difficulty did not of course arise in the case of machinery which was fixed, and would go with the hereditament as part of it in any conveyance of the hereditament, or if the owner were to leave it by will, or if, in default of a will, it went to the heir-at-law; but the difficulty was in the case of such machinery as was not so clearly part of the hereditament as to pass by a conveyance of it.

But for the decisions, one would have thought that, in the words of Lord Campbell in the *South Shields* case, the consideration of what the rating of such chattels ought to be, should be affected by the question of the extent to which the value of the hereditament was enhanced by being available for the erection and the use of such machines. If that were so, in the case of a factory where there was motive power, the motive power and the factory would be taken together, and with regard to the other class of machinery, whether worked or not by fixed motive power—the chattel machinery—the additional value, given to the building by the possibility of such chattel machinery being put into the building, would be

a question of ordinary supply and demand. But this could not now be so, for according to the decisions it was possible to imagine two factories of equal area in every respect, the one having machinery in it—not motive machinery, but chattel machinery—of the value of £10,000 and the other machinery of the value of £20,000. In the former a business might be capable of being carried on which was, for the moment, extremely profitable, and there was no doubt that in the market, that factory would have a certain annual value, which might well be greater than the annual value of the other, though in the latter case the machinery was worth twice as much. The machinery in the second factory might be only useful for the purposes of a business which was not, at that moment profitable, and a tenant would pay more for Factory No. 1 than for Factory No. 2, and yet the effect of the decisions was that the Assessment Committee might put on Factory No. 2 a considerably higher annual value than that put on Factory No. 1—a state of things which showed, he thought, that the law, as it stood, did not necessarily result in fair rating. Nothing was more likely than such a condition of affairs to depress a struggling trade or to hinder the development of a growing one.

The question then arose how was the matter to be dealt with. According to Lord Esher, in the *Tyne Boiler* case, the Act of 1840 had nothing to do with the question of how the value of real property was to be arrived at for the purpose of rating. Nobody who read the Act and had regard to its history could have any doubt whatever that the intention of Parliament was that it should have a good deal to do with the matter, but still the decision of Lord Esher was as he had stated, and therefore he thought the only plan left was to endeavour

as soon as possible to get the law altered on the lines of the recommendations of the Report of the Commission of 1900, which were as follows: "That a Bill shall be "brought into Parliament and passed which shall enact "to the following effect: 'That there shall be excluded "'from the assessment any increased value arising from "'machinery, tools, or appliances which are not fixed, "'or only so fixed that they can be removed from the "'place without necessitating the removal of any part "'of the hereditaments.'" On those lines was passed the Act of 1902 for Scotland, which removed the grievance of the owner of machinery. Some such Act was required for England, and until such an Act had been placed on the Statute Book, it was of no use to criticise the decisions of the highest Court in the realm. One could only obey the decisions with as good grace as possible, but as electors all were entitled to agitate in favour of such an alteration of the law as would make the incidence of local taxation fair and uniform.

Mr. D. DINWIDDY (Fellow) said the matter seemed to divide itself under two heads. First, the purely economic question, whether machinery should be rated, and secondly, if so, how it should be rated. The first point had been so ably dealt with by better heads than his own that he would confine his remarks to the second. The Courts, he thought, were quite clear as to what machinery should be rated, but they were not at all clear as to how it should be rated, and, as had been said, Lord Halsbury's decision did not throw much light on the matter. If, as Mr. Marshall had said, the Recorder's words were read into that decision, he thought it would be a good deal clearer; but the general opinion seemed to be that, since the judgment in the

*Hunslet* case, pretty well every machine, which helped to enable the premises to be used for the purpose for which they were intended, might be assessed.

It was said that the machinery was to be considered as enhancing the value of the building, but, after all, the buildings only enhanced the value of the land, and it was the land which was the bed rock. The only reliable way of valuing almost any factory was to estimate the replacement or capital value of the buildings and plant and take a percentage upon that. Cases of factories rented with machinery were very rare, but he had come across a case where a factory occupier was glad to pay a rent calculated at 10 per cent. upon the cost price of the machinery, and it was suggested that the terms were very satisfactory to the tenant, considering that the landlord would have to stand the cost of repairs and maintenance as well as the very possible chance of the machinery becoming obsolete. It must not be forgotten that, in taking 10 per cent. on the capital value of machinery, there was one-third allowable, not only on the value of the machinery, but on the buildings and land as well, which would bring the net assessment of the machinery down to very nearly 5 per cent. The replacement value was not necessarily governed by capital cost, and certainly not by depreciation value. It would possibly be something between the two.

He did not think it was the usual practice of surveyors, acting on behalf of rating authorities, to rate machinery up to the hilt. In London at all events the surveyor always tried to treat machinery owners fairly. He certainly thought the law ought to be interpreted in a generous and broad spirit, but so long as the decision in the *Hunslet* case determined the law, no sur-

veyor acting on behalf of an Assessment Committee could go into a factory and altogether ignore the machinery.

Mr. G. BEKEN (Fellow) said he had to do with a considerable number of small buildings which might be used as workshops, or manufactories, or small warehouses, the same building being sometimes let for one purpose and sometimes for another. At the present time he had a small building of two floors which was let to an engineer who used a gas engine for driving his machinery. He felt no doubt that, under the law as at present explained, machinery was liable to assessment; but the tenant would probably be leaving in a week or so from the present time, when the building would very likely be let for some light business similar to one next door, such as a blouse maker's or a mantle maker's. In that case there would be a number of sewing machines attached to the benches and worked by treadles, but there would be no gas engine or shafting. It seemed to be doubtful whether those machines would be liable to rating or not. Then, if the premises were let to other tenants, such as a bootmaker, there would be practically no machinery at all, nor would there be any if let as a warehouse. Now he only asked the same rent in each of those cases, and, being the landlord, had nothing to do with what the tenant put in; yet the premises might be rated very differently under the different circumstances.

Here came in a practical question of some difficulty: suppose that last year, when the quinquennial assessment was made, the place was let as an engineer's factory with gas engines, and the assessment had been raised in consequence. Assume that the engineer went away, and the premises were let for other purposes where no machinery was used at all, was that assessment to stand during the

current quinquennium? He thought that question had not been considered. In practice there would, no doubt, be found a way out, for it would be so obviously unfair, that an Assessment Committee with any regard to justice would allow the matter to be readjusted.

Mr. J. H. SABIN (Professional Associate of Council) said he thought Mr. Dinwiddy had put the matter in a nutshell when he said there were two entirely different aspects from which to regard this question. Under the recent legal decisions there was no getting away from the fact that some portion of any machinery in a factory must be valued. But he would rather detach himself altogether from the question of what was to be done under the present law as decided by the Courts, and look to some alteration of the law in the form of an Assessment or Valuation Bill, which the Government would probably introduce, to bring about some determination of the method by which machinery was or was not to be valued.

He tried to regard the question from an altogether detached point of view, and he entirely sympathised with the manufacturers' position. He did not understand why a building in which, for instance, there was a machine which would do the morticing of 40 doors in a given time should be assessed on any different basis from a building in which worked 40 carpenters who, with 40 mallets and 40 chisels, morticed 40 doors in the same time; nor could he understand why a building which might contain 40 wash-tubs with 40 washerwomen, should be assessed differently from one in which one big washing-machine did the work of 40 women.

He presumed that if the strict law were followed, in the one case, where manual labour prevailed, the building could only be assessed as a building, while, where there

was machinery fixed to the freehold its value would be taken into consideration. It appeared to him that the present condition of things constituted an actual restraint of trade, and he did not think the question could have been more accurately put than it had been by Mr. Page. What was wanted was to remove all restrictions that could possibly fetter the absolutely free action of economics in the encouragement of trade, whether that trade were carried on by the use of machinery or by any other effective means.

It had been suggested that there were very few instances in which machinery was provided by the landlord, but he thought that to say this was to overlook a very important branch of industry widely distributed throughout the county, viz. the manufacture of flour in mills, in the case of which it was becoming more and more the custom for landlords to provide the machinery. He had in mind at the moment a mill in the Midland Counties which was rated as a building at about £125 a year. The landlords had put into that building machinery of the value of about £2,000, and the tenant, of course, was most anxious that he should not be assessed on that machinery. It was fixed to the freehold as permanently as machines could be, which were replaceable if necessary; but the tenant was anxious that, on taking up a new lease, he should not be rated for the machinery, and he was endeavouring to get round the law as far as possible by treating the annual amount paid in respect of the machinery as interest on outlay and not as rent. He did not know whether that could be done, but probably, whether it were treated as capital or rent, the fact would have but little influence with the authorities.

It might be that in that particular district the assessment authority would be prepared to take the rent as

fixed for the building, and would overlook the fact that the man was paying rent for the machinery.

But he would make a further suggestion. After all, was a building, or was it not, increased in value by being put to the use for which it was actually designed?

That seemed to him to be the simple question. A house was built with the intention that it should be inhabited. To put a case—a building was erected for a certain purpose. He would not suppose for the moment that it was a building that could be used as a warehouse or a factory indifferently, for, in most cases, a building put up as a factory was intended to be used as a factory. Could it be said that, having been built as a factory, it was further increased in value by the fact that machines were going to be put into it? That could not be contended, any more than that a house was increased in value by the fact that people were going to live in it. Therefore it seemed that the only enhanced value of the hereditament was the fact that it was going to be used for the purpose for which it was built, and that increase of value, it appeared to him, was not one that could be based on the value of the machinery put into it. Looking at the matter from any other point of view, it seemed to him that two difficulties—conundrums—came to be answered: "When is a hereditament not "a hereditament?" The answer was, "When it is "a machine;" again, "When is a machine not a "machine?" and the answer was, "When it is a "hereditament." One was placed on the horns of a dilemma from which there was no escape but by saying that a factory was erected for the purpose of being used as a factory, and the only increase in its value was due to its present use as a factory.

He earnestly hoped that, for the sake of the great trade

of the country, which must be hampered by these elements, of uncertainty on the subject of assessment, the legislature would give some definite explanation of the principle on which buildings should be valued, and that in future the assessment should be calculated on the lowest mininum rather than the highest possible maximum rate.

Mr. R. F. STURGE (Fellow) said he thought all would agree that, if the law were carried out according to the latest decision, great hardship and injury would result in many parts of the country. One such instance was quoted in the Paper, where the trade of a manufacturing town had been almost driven away by the rating of machinery up to the hilt, while in another town, not many miles off, where machinery was not rated, the trade still flourished. Those two places were manifestly placed in very unfair competition.

He had in his mind a small town which was one of the seats of the clothing industry in the West of England, and in which he made a rating valuation of all the factories a good many years ago, before the rating of machinery had become a burning question, and when the general practice was that only the motive power should be assessed, which was the principle followed in that case. When the trade was in a depressed condition, as was not infrequently the case, to rate all the machinery in those factories would result, not in providing a fresh source of rateable value to the town, but, on the contrary, in driving away the trade, and consequently in a great reduction of rateable value.

It might seem presumptuous in a layman to venture to question the wisdom of the legal luminaries who decided these cases; but he must confess that, as a prac-

tical surveyor, he had never been able quite to understand the principle on which the decisions had been arrived at. It was said that a factory must be assessed according to the enhancement of its value due to the machinery in it, not that the machinery *per se* must be valued.

He confessed he did not see the difference in principle between a factory and a house in that respect. If the value of a factory was increased by the machinery in it, was not that of a house on the same principle enhanced by the furniture in it? A house was built for the purpose of residence, and was of no use as a residence without furniture, yet the furniture was not taken into account as enhancing the value. But houses were frequently let furnished, and the rent in that case was of course, very much more than that of the house unfurnished, and yet no overseer or rating valuer would dream of assessing the house on the basis of the rent at which it was let furnished.

It seemed to him there was a general consensus of opinion that the state of the law as to the rating of machinery was in a very unsatisfactory condition, and that the only remedy was fresh legislation. He believed that such a remedy would have been provided years ago if it had not been for the continual dead-lock of Parliamentary business. When one heard that a Rating of Machinery Bill had passed a second reading more than a dozen times by large majorities, it only remained to hope that eventually, if pressure were brought to bear, such a measure would be passed as would solve this very difficult question.

Mr. ARTHUR HARSTON (Fellow) said that the difficulties in which this question was involved were generally acknowledged. What had to be arrived at was what a tenant would reasonably give for the thing

as it stood, not for the piece of land and the building and so much machinery, but for, say, a shipbuilding yard or a laundry or any other industrial premises. In rating a laundry one must take not the mere occupation of the building and machinery, but its value to a tenant as a laundry. It had been truly said that the door key was part of a house and, as a matter of fact, was included in the rating of the house, although it was so small that its value would make no difference to the figure. Thus in the smallest laundry in a domestic building the copper lid was part of the house, but the copper-stick, used to stir the soap-suds, was not part of the house, and therefore one was rateable but the other was not. These were small matters, but the same principle ran through all. The largest private laundry would be rated as a laundry, but would probably contain little machinery.

The ordinary trade laundry filled with machinery would be rated with that machinery as part of the laundry; and, to come lower, a working man who had his washing done at home used no machinery, except perhaps a wringer, which, even if fixed, was not rated. The laundry of a workhouse or a hospital contained machinery, but this was taken not as machinery, nor was the building taken as so much building and so much land, but as part of the workhouse or hospital, which was rated as a whole. In the case of a foundry, some portion of the machinery might be on a large scale and out of proportion to the other, and the valuer must consider what a tenant would give for the whole of the apparatus and the buildings, having regard to the situation of the land—how much rent he could afford to pay as a manufacturer turning out goods for sale from those premises.

In the case of a brewery, a tenant must consider what rent he could pay. The true rent was not what the land-

lord might expect to get, but what a tenant might reasonably be prepared to give from year to year. He would not base his offer on the capital value of the machinery, some of which might possibly be fifty years old and some quite new. What he would have to consider would be how many quarters of malt he could turn into beer by means of the appliances in the brewery, and with what prospect of making a fair profit.

The tank referred to in the *West Ham* case was, as Mr. Castle had said, not an ordinary chattel. It covered a number of buildings, and it was not easy to see how it could be separated from them.

It was built on the premises in plates, put together just the same as brick on brick in building a house. It could not be removed as a tank, but it must be taken to pieces; what would remain would be a collection of cast-iron plates and of bolts more or less damaged and broken, and a ruin of roofless walls. But the judge evidently had in mind quite a different kind of thing from that which really existed. That showed how difficult it was for a judge on the bench to deal with a thing he had never seen and of which he had not the slightest conception.

The question whether machinery ought to be rated was, he thought, too large and complicated to make any observations upon at so late an hour, and was also perhaps somewhat outside the scope of the present discussion, though it might well form the subject of a separate Paper at a future Meeting.

The PRESIDENT said he was sure all present would agree with him that they were much indebted to Mr. Marshall for having written such a valuable Paper, dealing with a subject full of difficulties and a system

in which the anomalies were enormous, as he thought the discussion had shown very clearly.

He was much struck by what had been said by Mr. Payne in contrasting Nottingham and Chard with regard to the rating of lace factories, and with the valuable light thrown on the subject by Mr. Castle and Mr. Page and others who had taken part in the discussion.

The matter had been very fully threshed out, and if the outcome should be that an Act of Parliament were passed defining exactly what should, and what should not, come under rating in the way of machinery, he thought that the Meeting would have done good. He did not profess to be an expert on the question at all, but so far as he was able to see the rating law of England was, as he had said, anomalous, and he hoped that the present or some future Government would, at a date not not long distant, take the matter in hand and lay down something clear and decisive.

Mr. MARSHALL, in reply, said that some of the speakers had been good enough to express their indebtedness to him for his Paper, but putting it together had been a real pleasure to him, and he was much more indebted to them for their kindness in attending and taking an active part in the discussion, which had been of much interest and profit to all who had listened to it.

He could not help thinking he must come to the conclusion that, as regarded the things to be rated, surveyors and assessors generally could do pretty much as they pleased, and, with regard to the mode in which such things were to be rated, the same observation applied.

As to recent cases, and more particularly the *Hunslet* case, one got very little light or guidance from the Bench. And one could hardly help thinking that, if the Courts

had always been less careful to avoid difficulties, and had laid down the law in clearer terms than they had, they would have shown more consideration for those who only desired to get instruction from them, in order that they might be in a position to carry out the true spirit of the law.

He was much struck with the illustration given by Mr. Sabin in the course of his speech with regard to wash-houses and such places. When one came to think of it, there was no reason why, if the letter of the law were followed, the ordinary tubs used for the purpose of washing should not be rated in the same way as more elaborate machinery used for the same purpose, for he felt sure they might be brought within the four corners of Lord Esher's definition. They were on the premises for the purpose of making the premises fit for the purpose for which they were used, and if brewery vats were to be rated, he, for one, did not know why ordinary washing-tubs should not go into the same category, but, if that were so, except for the difference between furniture and machinery, one did not know either why a dining table or a billiard table or an ordinary chair in a house should not be rated.

The whole thing was in such an anomalous condition that it was hopeless to expect any judge-made law after the decision of the House of Lords, but in due time, it was to be hoped, some clear legislative definition would be given, and some endeavour made to bring the matter to a more uniform system. He wished to express his sincere thanks for the kindness and patience with which his Paper had been listened to, and the great assistance rendered by the speakers who had taken part in the discussion.

The Meeting then adjourned.

PAPER 317.
No. 494.

# THE ASSIMILATION OF THE PRACTICE OF QUANTITY SURVEYORS.

BY (THE LATE) JOHN LEANING (FELLOW).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, February 26th*, 1906, *at* 8 *p.m.*

CHARLES BIDWELL (President) in the Chair.

THE PRESIDENT said that the author of the Paper, an old and much respected Member of The Institution, having died since he had, with infinite care and patience, prepared the Paper and compiled the very elaborate schedule of variations which accompanied it, he would call upon Mr. Leaning's son to take his father's place, which, as a quantity surveyor, he was fully qualified to do, and to read the Paper. All present would, he was sure, sympathise with Mr. Leaning in the circumstances which compelled him to undertake the very trying duty, but he was equally sure that the duty would be ably and successfully performed.

Mr. H. J. LEANING then read the Paper as follows :—

The magnitude of the building trade and the various interests involved combine to impart a special value to any considerations which may affect its progress and prosperity.

Our intimate connection with this trade in our

relations with the employer, architect, and builder, and the growing power of this Institution, appear to suggest a somewhat closer attention to some questions which concern the quantity surveyor. His duties, his character, his training, his capabilities, and the consequent quality of his work, are all elements of importance to us. Nothing will so powerfully operate to raise the status of quantity surveyors, as a body, as a high standard of attainment.

The evolution of the prevailing system of building contracts has brought the quantity surveyor into a certain prominence, and there are symptoms of further advance.

Moreover, the importance of his work (now much more generally recognised than it was even a few years ago), the multitude of new inventions connected with building, the specialisation of various branches of the building trade, the preternatural sharpening of the wits of the builder's estimating clerk, and the general rise in the public expectation of what an architect should know, all combine to accentuate the distinction between the architect and the quantity surveyor.

There is no doubt that this distinction will become still more marked, probably with the best results to both branches of the profession; and in passing I may say that there are a number of powerful reasons why the architect should not supply quantities for his own works, perhaps the strongest being that it tends to subvert that impartial treatment of the building owner and the contractor which should be the architect's leading principle, and which (as experience shows) is often seriously impaired by his assuming the position of quantity surveyor. A logical corollary to this proposition is that the quantity surveyor shall not practise as an architect.

The desire for uniformity in the practice of quantity surveyors throughout the kingdom is not new, but the movement has hitherto made little progress.

The movers in the direction of uniformity have hitherto been occupied mainly in the consideration of the legal relations of the quantity surveyor with the employer, the architect, and the builder; these relations have been pretty clearly settled by legal decisions, and may very well be left to the operation of the common law, but, whether this is so or not, any desirable change in these relations can be best effected by a consensus of opinion and united action by all the quantity surveyors of the kingdom.

The advocates of what has been called uniformity of practice appear to adopt various views as to the degree and nature of the changes which may be desirable.

The report of the committee on the employment of surveyors (Royal Institute of British Architects, 1872) deals with the questions of uniformity of measurement, the making the quantities a part of the contract, the appointment of the surveyor, and the supply by the architect of quantities for his own works. A clause of this report which most concerns us at present is as follows:

"The more general adoption of quantities, the exten-
"sion to country work of the system of measurement
"usual in London, the gradual modification of local
"terms and usages, and, not least, the discussions con-
"sequent on such meetings as the Conference, will all
"tend towards uniformity of practice, and, as builders
"become more familiar with the London system of
"measurement, and the public better acquainted with
"the nature and bearings of the questions as to the
"employment of surveyors, and both recognise when

"such acquaintance increases the special advantage to "be derived from the adoption of one or the other "system of employing them, architects and surveyors "will find it to the interest of their employers to adopt "an uniform practice."

Our respected Past-President, Mr. Thomas Rickman, in a paper read (1890) before the Sheffield Society of Architects and Surveyors, "On the Present State of Questions relating to Quantities," said:

"Among other points which vary in their treatment "in this country, I may mention the treatment of deduc- "tions from walling and brickwork; the superficial "contents of slating and boarding as regards edges; the "measurement of materials and labour on masonry; the "treatment of timber by cube, superficial, or linear dimen- "sions; the extent of labours in the basis of joinery; the "supply of articles of ironwork by the several trades "(the divisions of the trades themselves is a larger "matter); the measurement of plumbing, glazing, and "painting. In all these there are diversities of opinion "as to right and wrong, which a united country, which "England has been since the Heptarchy, ought to have "found time to assimilate."

Two of our Fellows, Mr. Henry Blackburn and Mr. Henry Northcroft, have, in volume x. of our *Professional Notes*, advocated a combined effort for uniformity, and suggested the form it should take. I refrain from troubling you with quotations (although their views are worth quoting), for the papers are accessible to you all.

As you are also aware, one of the items of the programme of a recent proposal to establish on association especially for quantity surveyors is "uniformity of practice."

Let us consider what are the prospects of a project of of this kind.

There are four leading systems in England and Scotland (quantities in Ireland are, I believe, for the most part supplied by English surveyors), viz. London, Manchester, Edinburgh, and Glasgow.

London and the southern counties have no published code of practice.

The Manchester Society of Architects publishes a "general statement of the methods recommended by the "society to be used in taking quantities and measuring "up works."

Edinburgh, as the result of the united deliberations of their "ordained surveyors" and master builders, has published rules and regulations for the measurement of excavation, masonry, brickwork, carpentry, and joinery.

In Glasgow, the representatives of the "measurers" and the master builders have agreed upon regulations for the measurement of the following trades: excavation, masonry, brickwork, carpentry ("wright work"), joinery ("wright work"), glazing, slating, tiling, plumbing, plastering, and painting.

The Masters' Association of Glasgow and its neighbourhood have also drawn up certain regulations as to the time which should be allowed for the completion of measurements.

The architects and builders of Aberdeen have also published a set of suggestions for the measurement and billing of excavation, masonry, brickwork, carpentry, and joinery.

Among the causes of diversity of practice are—

1. The different systems of contracting,
2. The different modes of measurement, and
3. The different arrangement of the Bills.

1. *The Different Systems of Contracting.*—In London and the southern counties the system of a single contractor for a building is the prevalent one. Quantities are almost always supplied, and may be a part of the contract or not. In the country, although the system of one contractor is the rule, he often contracts with other tradesmen, such as plasterer, slater, mason, plumber, &c., to do a part of the work, although as a rule the architect will not deal with the sub-contractor, and usually knows nothing of him.

In Manchester the system of employing one contractor, or a contractor for each trade, or a contractor for several trades (not the whole), is in use. Quantities are nearly always supplied, and may be a part of the contract or not.

In Edinburgh the system is similar to that of Manchester, either the work is let to one contractor or in groups of trades, as excavator, mason and bricklayer, carpenter and joiner, smith and founder, or in single trades.

In Glasgow the system is similar to that in Edinburgh, but the quantities are practically part of the contract, as the whole is first measured and priced and, after completion, re-measured and priced again at the rates of the original schedules.

2. *Differing Modes of Measurement.*—I have prepared a tabulated comparison of the different methods of measurement in London, Manchester, Edinburgh, and Glasgow, which shows the leading differences in the various localities; there are others, but these are sufficient to indicate the task of the reformer. It has not been deemed reasonable to trouble you with the public reading of the schedule of comparative methods of measurement, but a copy of this schedule will be placed in The Institution library for the use of members,

and will, I hope, assist them to a conclusion as to the expediency of perseverance in such a movement as is advocated. In a paper it is only possible to allude to these in a general way. A few of these, as distinguished from London practice, are as follows:—

The practice of making material pay for labour is common, as when the surveyor makes no deduction for voids of less than an agreed superficial area. This custom is to be deprecated: net finished quantities of labour and material should be presented in the bill, and everything which has a value should be measured and stated in the bill.

The various points of interest are—

The general use of the superficial yard instead of the superficial foot or the square of 100 feet.

The measurement of labour to openings and plumbing of angles and jambs.

The measurement of brickwork by the yard instead of the rod reduced.

The separation of various thicknesses of walling and the treatment of deductions.

The more elaborate measurement of stone walling, the reduction to a standard thickness, and the greater number of distinctions therein.

The measurement of stone and labour together by the lineal foot, with sketches.

The numbering of pieces of stone of various shapes, with sketches, instead of measuring the stone per foot cube or superficial, and the labour by the foot superficial or the foot run.

In Edinburgh and Glasgow, the distinctions between sizes of stone, and the measurement of every hewn stone, first as rubble, and making no deduction.

The measurement of timbers by the superficial yard, stating their size and distance apart, instead of per foot cube.

Measuring timber and labour separately or per foot run, stating size and labour.

The separation of deals and battens used for carcasing from the timber sawn out of log.

Tiling by the superficial yard instead of the square, failure to deduct certain voids, measurement of cuttings as extra value instead of adding a quantity to the net superficial measurement.

Slating by the yard and different allowances for cutting.

The inclusion of grounds with lineal items of joinery.

The general measurement of joinery.

The specific description of various items of scaffolding.

The failure to deduct certain voids in the plastering, and measuring labour to hollows.

The treatment of structural metal work.

Measuring and billing lead per foot superficial, and per foot run.

Measuring lead in sinks and cisterns per foot superficial, to include soldered angles.

Lead pipes including branch joints, &c.

No doubt much of this practice is the result of local custom. In London, our units of measurement are mainly referable to the way the merchant charges the material, or the way the mechanic is paid for labour only.

The components of concrete, sand, gravel, and lime are bought by the cubic yard: stone and terra-cotta by the cubic foot: timber by the load, from which the

price per cubic foot is readily derived; deals and battens by the St. Petersburgh standard, from which the price per superficial foot is easily calculated; flooring and rough boarding by the square of 100 feet; lead by the hundredweight. Plasterers' and painters' labour is paid by the yard. Asphalte, brick, and tile paving is laid by the yard, &c.

On these grounds the presentation of the items in their ordinary form is logical enough.

Uniformity can only be obtained by taking broad views, ignoring unessential differences, and by the adoption of the principle of describing items in such a way as to be most readily priced by the majority.

Permit me to suggest briefly a few of the compromises which appear to me to be reasonable, and which might be adopted as being as easy to price as the present. These are not intrinsically better, but they would be evidence that we do not wish to impose our London system intact. A complete list is impossible within the compass of a Paper.

The measurement of the net quantity of labour and materials in every case, the deduction of all labour and materials at voids, and consequently, the discontinuance of all allowances of superficial quantity of labour and materials to cover the cost of extra labour.

The avoidance by the quantity surveyor of responsibility which is not properly his, as, for instance, stating the nature of the soil.

The concentration in the preliminary bill of all general items when there is one contractor for the whole work.

The adoption of the yard as a superficial unit instead of the foot or the square.

The adoption of the lineal foot for all lineal measures.

*Excavator.*—Discontinuance of the allowance for slopes or batter, measuring instead of strutting and planking, with the proviso "if required.'

*Bricklayer.*—The uniform adoption of the superficial yard as the unit for all brickwork; all, except one-brick walls fair on both sides, and half-brick partitions, to be reduced to one and a half brick thickness.

The measurement of all salient angles per foot run for plumbing.

The measurement of all salient angles of reveals of openings per foot run.

*Mason.*—The Scottish masons are a class of capable men and their conclusions about the measurement of stonework are to be respected; a number of their distinctions as to size of stones are, I believe, the result of quarry regulations, but, in a building with much stone in its construction, the small stones would probably tend to balance the extra value of the larger ones.

I do not think the London practice in the measurement of masonry, *i.e.* the stone per foot cube, and the labours superficial and lineal can be improved upon. By that system the surveyor has done what has to be done afterwards by the estimator when an item is presented in the bill with a sketch. Making the price of masonry include plain beds and joints and preliminary faces would, I think, be a step in the right direction.

*Rubble-walling.*—The Scottish practice as to rubble-walling appears to be reasonable, except in the measurement of all the worked stone first as rubble and making no deduction for it. I incline to the opinion that our practice is simpler and just as easy to price, and in respect of measuring, the net cubic quantity is superior to an imaginary one.

*Tiler and Slater.*—Instead of allowing superficial quantity for cutting, the items might be uniformly run and described by the lineal foot—such as "extra on "ordinary tiling for hip and valley tiles, including all "cutting and waste."

"Raking, cutting, and waste to hip and valley, one "side measured, &c."

*Carpenter.*—Our measurement of carpentry is, I think, susceptible of improvement.

The uniform adoption of finished sizes, clearer distinction as to fir framed in various ways, the distinction of fir sawn out of log from deals and battens, and the counting of all trimmings (often ignored) would be advantageous. I do not think the billing of timber can be made clearer by any other method than the cubic foot, nor by departing from the principle of categories, nor by distinguishing framing to hips and valleys and similar items, especially in consideration of the fact that a carpenter will readily make a sub-contract for the labour to the carcasing of a whole building at a uniform price per foot cube.

In some parts of the country timber is billed by the cubic foot followed by the description of the scantlings comprised by the total, as, for instance, "800 feet cube "fir framed in plates, floor joists, and bearers (in deal "scantlings) $4\frac{1}{2}$ inches by 3 inches, 6 inches by 2 inches, "7 inches by 2 inches, $5\frac{1}{2}$ inches by 3 inches, 7 inches "by $2\frac{1}{2}$ inches."

*Joinery and Ironmongery.*– As in carpentry, I advocate the adoption of finished sizes and the substitution of the yard for the square; in other respects I do not think the London method of measuring joinery can be improved.

*Plastering.*—There is not much to reconcile between the systems. In Edinburgh and Glasgow, apparently,

the lathing for plasterer is separated from the plaster float and set, and billed with the carpentry.

*Founder and Smith.*—The London practice of concentrating the structural metal work into a few totals appears preferable to the billing joists by the foot run, and takes far less time to price, and our general custom of reducing the metal articles to weight is a logical result of merchants' quotations.

*Plumbing.*—The distinctions of lead work in a well-prepared London bill, and its method generally, would not, I think, be improved by the adoption of any of the provincial arrangements.

*Glazier.*—This appears to be treated in a similar manner throughout the Kingdom.

*Painting.*—This appears to be similarly treated everywhere; the provincial method of measuring iron balustrades and sashes and frames over all, is not, I think, to be commended.

3. *Billing.*—Before comparing the various forms of bills of quantities, one naturally asks what are the characteristic merits of an ideal bill of quantities. They are, I think, the following:—

1. Precision of description, which goes far to prevent extras, assists the pricing of items of variation and preserves the building owner from legal difficulties.
2. Brevity, so far as consistent with clearness of description; because it saves the time of the estimator, who probably prices a large number of bills of quantities in the course of the year, and whose time is usually valuable.
3. Presentation of the items in the form easiest to price, and consequently saving the estimator the trouble of analysis.

4. A settled order of the items for facility of reference.

The degree of detail which the surveyor shall adopt requires judgment; the measurement of insignificant, almost valueless items—over-refinement in fact—is the temptation which besets the surveyor of exact mind. The difficulty of deciding when to stop is increased by the extraordinary claims made by some surveyors and builder's clerks, who allege imperfect descriptions. The expert estimator rejects many of our refinements as frivolous and does not price them, but, if we omit them, is ready enough to make claims for their value. The only safety for the surveyor is a thorough knowledge of prices.

In London practice, three documents are the rule, the drawings, the specification, and the bill of quantities, and as a rule the quantity of one kind of material and labour, as "$1\frac{1}{2}$-inch four-panel square frame door," for instance, appears in one item, irrespective of its position in the building: the specification settles that.

The preamble to each trade comprises sufficient information as to the materials and workmanship.

In other parts of the country the quantities and specification are often combined in one document. The work in each trade in one part of the building is kept separate from that in another, under distinguishing headings as basement, ground floor, first floor, &c., and the specification items relating to each trade are written in the preamble to that trade; the position of the work is fixed by the headings of the separate sections of the bills. The estimator is thus subjected to the trouble of pricing an item of the same kind in a number of different places, and if his tender is unsuccessful, has been involved in the reading of conditions which concerned him but little.

In Scottish bills of quantities one sees such arrangements as the following:— Separate sections for the timbers and boarding of each roof or flat, the joinery of particular apartments, an oriel window in all trades except plumber, glazier, painter, &c.

The result of these arrangements is to make the bill inordinately long. The majority of the items of a bill of quantities are of the same value, whether in one part of a building or another, and if one rejects the principle of combining quantities and specification, the indication of position may as a rule be abandoned.

The practice of getting a separate tender for the work in each trade also contributes greatly to lengthen the bill of quantities, as a number of items must be inserted in the bill of each trade, which, in the case of a tender by a single contractor, are once for all included in the preliminary bill.

In many of the bills, the principle—pretty generally adopted in London billing—of ignoring anything under 6 inches in a total, and calling 6 inches or over in a total another foot, is unknown; we see such items as 5 feet 9 inches, 6 feet 6 inches, 4 feet 3 inches, 3 feet 2 inches, &c.

In addition to these well-known leading systems, there are architects all over the country adopting modifications or combinations of them all.

A comparison of the relative advantages of a contract, with one contractor for all trades, and a separate contract for each trade is perhaps irrelevant; but one may say in passing, that the London architect prefers the former, because the responsibility for the work is that of one man instead of a number of men, the conflict of interests of the various trades is avoided, the business of giving certificates and the supervision are less troublesome, and

the sole contractor is usually a more substantial and responsible man than such as tender for one trade. Moreover the large firm commonly does better work than the small man, and is much more likely, once he has begun, to finish it.

Let me call your attention to a few considerations in favour of this movement for uniformity.

I think you will agree with me that settled and uniform practice is a great element of strength to any profession.

The divided counsels of London, Manchester, Edinburgh and Glasgow are sources of weakness to the quantity surveyors as a body. Unity of purpose and action would ensure a degree of influence and consideration, far beyond anything to which their order has yet attained, and withal an extension of that good fellowship which is so essential to our efforts.

The establishment of unvarying and uniform custom would, besides other advantages, furnish very strong arguments in defence of points of practice which might be questioned.

The quantity surveyor has already done much to settle the mechanism of contracting and to smooth and improve the relations of the various parties to a contract. He will deserve well of posterity if he succeeds in reconciling the differences such as we are now considering.

Some of the differences between methods of measurement are considerable, while some are insignificant. Some of the methods of the London surveyor might probably be readily adopted by the provincial societies, and the London surveyor could certainly use some of theirs with advantage, such as the measurement of brickwork and other work by the yard, measuring labour to openings and reveals and angles and the like.

There is a disposition to vaunt the superiority of the London quantities to a degree which is not warranted. The codes of measurement of Manchester, Edinburgh, and Glasgow, are, in my opinion, very creditable performances.

The task of the reformer, its successful conduct and completion, will be tedious and difficult. It will involve the investigation, reconciliation, and adjustment of the various modes of measurement, and the settlement of two forms of bill, one adapted to a contract with separate trades, the other to a contract with a sole contractor.

Probably the customary local bill, if well done, is best understood by the local men, but there are few parts of the country where a London bill would be misunderstood, and in many cases it is welcomed. Radical alteration in billing would probably be resisted by builders accustomed to pricing items billed in a particular way; indeed many of them would find it difficult to price an item presented in a new fashion.

I doubt whether local phraseology is of sufficient importance to take much trouble about; the list of obscure words is not a long one. If we establish valuable fundamental principles, we may very well afford to let mere words alone, for the attempt to interfere too much with them would embarrass our efforts.

I have laid before you some of the points of difference, which is one step towards improvement. The other societies have probably as good an opinion of their system as we have of ours, but, at any rate, if there is a strong body of our members desirous of a change, consultation with the three societies before mentioned might result in the production of a working system which would be an improvement on that of either of the four.

It should be remembered that, in any attempt which may be made, we have to conciliate not only the surveyors and architects concerned in the four competing systems, but also the builders of their districts, and in the case of Edinburgh the board of examiners of the ordained surveyors will have to be convinced of the necessity of changes. It should also be remembered that the architect usually appoints the quantity surveyor, and that the concurrence of the architects will be not only valuable, but necessary.

I do not know that I can suggest a more practical method of arriving at a conclusion than that proposed by Mr. Blackbourn, and I quote the concluding clauses of his article (*Professional Notes*, vol. x., p. 318).

"As a means of issuing a standard of rules, a joint "committee of, say, three London, two country, and two "Scottish surveyors might meet, and in a few sittings "draw up a general code of rules applicable throughout "the kingdom. These could be circulated among the "members of The Institution, and communications might "be invited, the rules might then be revised by the "committee at a second series of sittings, and finally "issued as a standard."

Mr. H. T. STEWARD (Past-President) said he rose with very much pleasure to propose a cordial vote of thanks to Mr. H. J. Leaning for reading the Paper, which must be of much interest to all who practised in his branch of the profession; but, before going further, he wished to associate himself with the regrets expressed by the President that Mr. John Leaning had not been spared to read the Paper which he had prepared.

Before proceeding to consider the question of the assimilation or uniformity of practice among quantity

surveyors, it might be well to inquire for a minute what was the object and origin of bills of quantities.

There could be no doubt that bills of quantities not only existed, but were primarily intended, for the use of builders in tendering. His experience, which now extended over somewhat more than half a century, was that there must be a difference, and there had always been a difference, and, he ventured to think, there would always be a difference, between bills of quantities provided for two totally separate and distinct businesses, viz., those that dealt with engineer's or contractor's business, and those that dealt with the architect's or builder's business. Personally, he had been largely concerned with both during his professional life. He had found no difficulty in making the necessary differences, and had not heard any complaint of want of uniformity. He ventured to think the same remark applied, so far as his experience went, to what he might term the London system, as distinct from the Midland and North Country systems, of quantities for architect's work, to which he assumed the Paper was more especially intended to apply, and to which he would confine his remarks.

The theory of making one sort of bills of quantities applicable to the whole Kingdom was by no means new. It had been heard of many times before, but he could not help thinking that, if any strong desire existed on the part of the builders of England for a uniform system, their desire would have been expressed. Builders were the people mostly interested in this question. The Master Builders' Association, or some of the societies which represented builders all over the country, would be sure to have expressed such a desire if it existed on their part. If that had been the case, he

would be one of the first to advocate an attempt being made to meet such a view, but he could not help thinking it was not for the surveyors to take the initiative in a matter which was more for the builders than for themselves.

He might mention, in this connection, that the master builders, when they felt that a question of importance to them arose, had not hesitated to point it out to surveyors. It was not many years since the Builders' Society brought to the notice of the Council of The Institution what they termed a "growing practice on "the part of surveyors," of measuring cube stone to include all labours for architect's work, to which they strongly objected, and they particularly requested the Council to do everything possible to compel Members of The Institution to adopt the proper system of measuring stone cube and labour superficial. On behalf of the Council, he had expressed entire sympathy with the builders in their complaint, regretting to hear it was a growing practice, and trusting it would in future tend to diminish, and not to increase. At the same time he pointed out that they, as a Council, had no power to compel Members to deal with the matter in any particular way; it must rest with the individuals, and with the builders. He had stated, however, that in the examinations, the measurement of labour on stone-work was made a strong point, and it was fully intended to continue that system.

He thought by this it was evident that the builders of England were ready to represent to the surveyors anything that they felt to be a matter of importance, and he could not help thinking that if the question of uniformity of practice among surveyors with regard to

bills of quantities were a grievance to builders, they would have so expressed themselves.

There was one little point to which he would refer. The author of the Paper seemed, if he understood him rightly, to have suffered a good deal in consequence of that "preternatural sharpening of the wits of builders' "estimating clerks," to which he had alluded, and the extra claims made by "builders who alleged imperfect "description." Every surveyor had met with this difficulty, and would often do so again if he lived long enough.

His own experience was that there always had been, and he believed there always would be, both good and bad among such a large body as that of builders' estimating clerks. He had known many for whom he had the greatest possible respect, and whom he should be pleased to recognise as surveyors instead of estimating clerks, and to welcome, if it had been possible, into the ranks of The Institution, to which many of them would be a credit and honour. At the same time he knew many others of the class at whose hands Mr. Leaning had evidently suffered, and his experience was that the ways, manners, and wits of those gentlemen were very much the same now as they were fifty years ago, and, as he had very little doubt, they would continue to be fifty years hence.

He thought that there was no doubt that conciseness and comprehensiveness of description in bills of quantities were the best means of preventing unfair claims. He might, perhaps, mention with reference to this matter that he had noticed, he regretted to say, a tendency, not in his private practice, but in cases where he had sat as arbitrator, for surveyors of independent position to put forward, and to give the countenance of their names and

the weight of their authority to, claims which he would only say had been better left to the estimating clerks to whom Mr. Leaning had alluded.

It was not possible, in the time available, to deal with all the subjects mentioned and the different methods of measurement alluded to in the Paper, but he would like to say a few words upon some of them. As to the practice of making material pay for labour, he could hardly imagine any surveyor contending for a moment that that was a right principle. Quantities should undoubtedly be net. This was stated in pretty well every case, particularly in the case of stone-work. Stone was practically always described as being "measured net," and that could only have one meaning in the English language.

If a building was to be 50 feet long, and the architect wanted it divided into 16 equal stones, it meant that those stones would come to odd half-inches, and if half an inch was put on every stone the total measurement of the building would certainly not be only 50 feet. If, in the case of brick-work which rose 13½ inches to the four courses, every stone of the ashlar was to be measured as 14 inches high, the result would be altogether erroneous. He had never done such a thing, and he intended never to do so; for certainly in such cases the building would come out at considerably more than it should, and the stone could not be described as "measured net," as was put in the bill of quantities.

As to the question of measuring by the superficial yard, or superficial foot, or the square of 100 feet, he did not think that was a matter of much moment.

It could not make any appreciable difference, and if the builders of England wished surveyors to adopt the superficial yard instead of the superficial square or

foot, he would be one of the very first to do it, and he anticipated no difficulty. It was somewhat similar to the case of learning a language. Anyone who knew French or German thoroughly—which he did not pretend to do—was capable of thinking in the language, and until one could think in the language one could not completely understand arguments put forward in it. In the same way, London surveyors were in the habit of thinking in rods superficial reduced, or in yards—but they could soon get out of that way, and acquire the habit of thinking in feet or any other unit.

The question of the "measurement of labour to "plumbing angles of jambs or quoins" had been often raised during the last 30 or 40 years, to his own knowledge. The only argument against it was that it was not customary, that builders did not expect it, and did not imagine it was going to be done; but if builders generally said they would like to have it, he for one would do it to-morrow. No doubt plumbing quoins was extra labour and the brickwork in a blank wall could be done cheaper by the rod than one with many window openings, and it would not be at all unreasonable for the builders to ask that a distinction should be made; but until they suggested it he did not think it was for surveyors to do it. An experienced builder, seeing by the drawings that there would be many or few openings, could say at what price he would do the brickwork by the rod, and did not want all the quoins and angles measured.

With reference to stone and labour, he thought he had already expressed his views, and he would only further remark that, in the North of England, he knew they dealt there with stone by numbering the various pieces and giving sketches. Amongst many other stone buildings which he had done was that of the Law Courts

and he might say that the description of the stonework in that case filled a great many bulky volumes. If he had attempted to adopt any other than the usual method, the length of the mason's bill would have reached from there to St. Paul's.

With reference to boarding, tiling, and slating, whether it were measured by the yard or the foot super was a matter of no consequence, but in the failure to deduct certain voids and measure labour to cuttings, instead of adding to the superficial measurement, he thought there was a certain amount of—he did not like to say error, but—obliviousness on the part of many young surveyors of the present day.

He would give an instance. In the case of a floor there might be boards coming to an end at a wall which was not square with the room. It had been customary for surveyors to take three inches on the floor boards to allow for the cutting and waste, but he did not hesitate to say that was not the right principle. He had not adopted it himself, except when he had discovered that the three inches was actually the reasonable and proper allowance to be made. There was no justification for measuring in that way unless one set the work out and took what was fair waste.

The same applied to slating where there was raking cutting and waste. In the case of duchess or countess slating, for cutting to hips and valleys, it was the general custom to take six inches, and if it were set out, it would be found that six inches was not an unreasonable amount to allow, though in countess slating it more frequently came to five inches than six, but the difference was not worth talking about. No doubt, in principle, the right thing to do was to measure per foot run for cutting and waste.

And here he would urge that it was not for the surveyor to take more responsibility on himself than he was obliged to, in order to translate the drawings and specifications into a bill of quantities for the builder. If there were any unknown liability it was for the surveyor to express it in words, from the best information he could get, and to put the onus of it on the builder. The surveyor's business was to tell the builder what he had to do, and if he did not like to tender, he need not do so. It was not the surveyor's duty to tell him how to do it, but it was for the builder to take on himself that responsibility.

The same remark applied to the question of digging, which Mr. Leaning mentioned, and to strutting and planking. He agreed that in some instances an architect or engineer, building a reservoir in an open field on bad ground, would say that it was for the builder to speculate and decide for himself whether he preferred to strut it all round, or whether the ground would stand at such a slope that he could build the reservoir without going to the expense of strutting and planking. That was a reasonable and proper responsibility to put on the builder.

He had heard of surveyors in the North taking responsibility as to the ground, but it was certainly not one that they ought to take, for the matter was clearly one for the builder to inquire about, and if necessary to speculate upon.

With reference to stone-work, he should like to say a few words as to making the price of cube stone include plain beds and joints and preliminary faces. To offer him such a suggestion was rather like showing a red rag to a bull. He had set his face against it all his life, and he ventured to think he could give very good reasons why he had done so.

He hoped it would not be thought that he wished to boast of what he had done in the way of measuring. He had mentioned the case of the Law Courts, and in that case and in respect of many other great buildings, he had prepared a statement showing the proportion of feet superficial of bed and joint to every cube foot of stone. The superficial quantity of bed and joint to the cube foot of stone he found to vary from 9 or 10 inches up to 22 inches. That was all on work which he had done with his own hands, and therefore it might fairly be assumed that he had done all on the same principle. If that were the case, and yet they varied to such an extent, he ventured to think it was not an unreasonable thing to take the beds and joints separately in the bill of quantities.

He knew it was often said that builders did not price labour. That was for the builders to say and not for the surveyors. All he knew was that any capable estimator, whether a builder or a builder's clerk, if he were in a hurry to price his bill of quantities and had not time to price the labour, would first ascertain how many inches of bed and joint there were to the cube foot of stone, and how many inches of plain face and of moulded face, and he could then pretty well tell what the price would come out at, including labour. It was a question of practice and experience, which enabled some builders to do in half an hour more than their estimating clerks could do in a day, and to arrive at the price with as much accuracy. There were many such builders, who thoroughly knew their business, in London, though he was ready to admit there were some who did not.

As to the question of billing, that was a matter of very small moment on which every surveyor had his own views.

He must apologise for the length of his remarks, but before he concluded he would like to say that he had spent a good many hours in looking at the comparative statement which the late Mr. Leaning had compiled showing variations in the methods of measurement between London, Glasgow, Edinburgh, and Manchester. He thought it was a most interesting statement. It would be kept in The Institution Library for reference by the Members, and he was sure that anyone who was concerned with the different measurings as between London and the North Country could not do better than peruse that document.

Mr. HOWARD CHATFEILD CLARKE (Fellow) said, although he unfortunately knew very little about the subject, he had very great pleasure, as an architect, in seconding the vote of thanks so ably proposed by Mr. Steward. He rather feared that the profession of which he was a humble member was generally regarded as a bugbear by quantity surveyors, so many of whom he saw present who would, he was sure, speak with authority on the Paper. The tale went about that their drawings always reached the surveyors late, that no proper time was left in which to take out the quantities, and there was even a legend that eminent architects only submitted their drawings in pencil to the unfortunate surveyors who were called upon to interpret them. Whether that were so or not he would not pretend to say, but he did feel that the Paper would greatly help every one concerned with quantities on many difficult points, and on most of those points he was in entire accord with the author.

He did not believe it was an architect's province to interfere with quantities. He had never done so himself,

and indeed he must admit that he knew very little about them. On the other hand, he agreed with the statement in the Paper that it was not a quantity surveyor's province to practise as an architect. They were kindred professions, but he thought they were much better separate. He also held that much difficulty would be avoided by never making the quantities part of the contract. He had always connected the drawings and specification with the contract, but he had never made the quantities part of it.

As to the question which Mr. Steward had raised with regard to foundations, he never thought that surveyors did deal with it, but that it was left, as a rule, to the builder to find out. In the case of special works, trial holes were often put down by the architect before they were begun.

The question of precision of description seemed to him to be everything in the preparation of quantities, for on the very minutest details he had sometimes received claims for extras. Unless he specially described such small things as "glass cleaned both sides" he found himself liable to be charged for it as an extra.

In the case of a difficult alteration job the method of taking it floor by floor was of great value to both the builder and the employer. He had a case lately where the building was altered floor by floor for 6 or 7 stories. He thought it could only be described floor by floor and he had so taken it, as had the quantity surveyor. The builder was thus enabled readily to price it out, and it worked out satisfactorily, whereas a bill of quantities taking in the whole of the work would, he believed, have been very difficult to follow.

Mr. E. J. BURR (Fellow) said he had first to deliver a

message from his partner Mr. Rickman, who was sorry to be unable, on account of ill-health, to be present. He had very pleasant memories of Mr. Leaning for many years past, and extremely regretted that he had not been spared to read the Paper himself. He could only add that he (Mr. Burr) felt the same regret, having known Mr. Leaning for 25 years, and been in touch with him, more or less, during the whole time.

Turning to the Paper, he would endeavour to make his remarks as brief as possible. First, as to uniformity of practice. There had, he thought, been more progress made in that direction than was generally realised. He had a good deal to do with North Country work, perhaps even more than with London work, and a few weeks ago a country contractor, when talking to him on this point, said: "You London surveyors misunderstand "us completely. The sort of quantities we like to see "are London quantities; we do not want them altered, "for we understand them perfectly well. We know "what a rod of brickwork is, and it is rather a slight "to us to suppose that we want it turned into yards."

He thought that a little too much had, perhaps, been made of the existing differences. In his firm's practice they had always, to a certain extent, adopted the North Country system for North Country work, and the remark he had quoted rather opened his eyes to the fact that they had been taking more trouble than was needed, that in fact it was not necessary to level down to the country practice, which he maintained was not as good as the London practice, to which he would like to see others levelled up. He felt certain that if London surveyors stuck to their London practice they would in time convert the whole country to it, and he was sure they could not better it.

He was confirmed in that opinion by handling, as he had recently done, a set of quantities from Liverpool. The enormous bulk of them, and the repetition and sketches, were perfectly alarming. He supposed that under that system the work was got through in a reasonable time, but it was certain that the lithographer derived considerable benefit from the system.

Among other places where special rules existed, besides those mentioned in the Paper, was Leeds, where the master builders had a little list with schedule of prices of their own which they sent out, and had tried very hard to get surveyors to adopt. There was a good deal of Leeds work in their own office, but they had refused to recognise it, and the builders did not seem very much upset by the refusal.

There was a doubtful advantage in having a too close uniformity of practice. He maintained that surveyors should have their individuality, as he was sure Mr. Steward, Mr. Rickman, and other leading men had. Surveyors must not allow themselve to degenerate into mere animated dividers or measuring machines. They had brains of their own which should be developed for the use of the profession, and he believed that by doing so they would improve the practice of quantity surveyors, and that the good men would command a better position than if they all tried to work on a dead level. After all, that was the case in every profession and business. With regard to country practice, he might mention that he had that day been looking at a bill priced by a country contractor in Sussex, who, although half brick work was billed by the foot super, had priced it by the square. That was a revelation to him, and he could tell of other eccentricities in the pricing of that bill.

In Canada, an extraordinary practice would be found

to prevail. They reduced timber and joinery to a standard of 1,000 feet of one inch super, but he thought that practice was not likely to be adopted here.

The different methods of measurement were, he thought, very important. Mr. Leaning said in his Paper, "Uniformity can only be obtained by taking broad views, "ignoring unessential differences, and by the adoption "of the principle of describing items in such a way as "to be most readily priced by the majority." The importance of that paragraph ought to be emphasised, he thought, for it seemed to him to be the key of the whole matter. What was wanted was uniformity in essentials, not in unessentials. He apprehended that anything which added to the quantity surveyor's labours was undesirable, for there was labour enough in taking off quantities, abstracting and billing them, and if some new sort of by-laws for regulating surveyors' methods were to be enforced, he for one would strenuously oppose it.

The question with regard to deals and battens and sawn timbers was not, he thought, a serious one now that every conceivable size was imported.

He did not know what to say about cuttings. He must confess that he had been guilty of always allowing 6 inches on slating for cutting, and he thought many of those present would have to admit the same, and similarly as to cuttings on boarding, 3 inches. It might be very wrong indeed, but it was done.

The responsibility with regard to the bottoms of trenches was a serious one, but where there was likely to be a bad bottom he always inserted a provisional quantity as a way out of the difficulty.

The measurement of angles and reveals was a very important matter. Personally, he thought it better that

it should remain as at present, because, with ordinary facings, he was convinced that under the usual system a very fair result was arrived at.

On the matter of beds and joints, Mr. Steward had taken the words out of his mouth, for he had intended to make very much the same remarks. It was found in practice that the proportion of bed and joint to the cube foot varied from 1 foot 3 inches to 2 feet 6 inches, and if these were included in the cube it was obvious the pricing must be mere guess work. In London it would be found that the proportion of labour varied very considerably indeed, according to the size of the stone and details of the work.

Reference had been made to the cleaning of glass, a point which, small as it might seem, did really touch him. He recalled the case of a large hospital in the north of England, where there was the usual item for cleaning the windows. But the contractors refused to clean them at the end of the job, because they said that every window was cleaned when they glazed it ; and so they got the extra allowed for doing it a second time, which came to £15. Since then there was always inserted the item " Clean both sides after glazing and " after completion of the work."

Mr. A. J. GATE (Fellow) said it gave him great pleasure to speak on the Paper, not only because the matter had always been one of interest to him, but also because Mr. Leaning's Paper had evidently been carefully thought out by a man who certainly knew his subject thoroughly.

He had always so far agreed with all that Mr. Leaning had said, that in the course of a similar discussion a year ago he had used words which, with the permission

of the Meeting, he would read from the report in the *Builder* of April 22nd, 1905. The report was as follows: "As to the advisability of making quantities "uniform, Mr. Gate said he saw no difficulty in making "them uniform in the United Kingdom, but that in the "Colonies it was not possible to make quantities uniform "with the quantities here. In England he believed that "matters would gradually right themselves if surveyors "did one thing, *i.e.* use the London system wherever "they sent their quantities. That was his practice, and "he found provincial builders not only liked that, but "wished they could get quantities drawn in that way in "their districts. But there were differences between "the quantities of London men, and if the London "system was to be generally adopted in the provinces, "some of the best points of other systems would have "to be included. Until that was done, those in the "provinces could fairly object to adopt the London "system, and if they wanted to make quantities uniform "they must make their system as perfect as possible." What he said then he was prepared to maintain on the present occasion.

"The assimilation of the practice of quantity sur-"veyors" was the title which appeared at the head of the Paper, but he thought that the author had begun at the wrong end. Assimilation throughout the country must be led up to by the introduction of uniformity into the London system. How widely London surveyors differed among themselves Mr. Steward's remarks showed, when he said that he did not think it was the duty of surveyors to save the builder's risk, and if there were anything in the drawing or specification of which he could not fix the present value (he hoped he was not misquoting Mr. Steward), that he left it to the builder

to find it out and to take the risk. That was a very different practice from his own. If the architect was not clear as to what he wanted, and he did not exactly know himself, he ascertained, as nearly as possible, what it would probably cost, and put in a provisional sum for that amount.

As Mr. Steward rightly remarked, the subject was by no means a new one. The Paper assumed that there were four systems—London, Edinburgh, Glasgow, and Manchester. But he contended that there was to-day in London no recognised system. Forty years ago, when he was in his training, there was a recognised London system, which was a good and thorough system, by which every builder could price, and which was adopted by all the prominent quantity surveyors who had been taught it and brought up in it. In those days the premiums for pupils were high, and unless a young fellow had been very fairly educated no surveyor would take him into his office at all. All pupils were taught their business thoroughly, and all on one system. Nowadays he feared the case was different, and that there was too great a tendency to rely on text-books, many of which had far better never have been written.

The question that would naturally arise as to the assimilation of quantities was how the present state of things was to be remedied: as Mr. Burr had said, any levelling must be levelling upward. It could not be supposed that surveyors would lend themselves to any process of levelling down. Unless they could improve matters they would not attempt any assimilation.

For something over 35 years, The Institution to which he had the honour to belong, had been the only examining body in England for surveyors. During that time it had passed into its ranks hundreds of Members

by examination, and there had been until within the last two years no other body representing the profession.

THE PRESIDENT said he did not wish to interrupt Mr. Gate, but he must ask him to keep to the Paper. They were not discussing the education of quantity surveyors, but the desirability of assimilating or standardising their practice.

Mr. GATE (continuing) said he was discussing the assimilation of the practice of quantity surveyors, and he did not see how that subject could be approached without also discussing the education and examination of surveyors. That was his point. Taking it on that ground he would say that The Institution having for 35 years been the examining body, one must look upon them as to some extent responsible.

If it were thought desirable to adopt the London system of quantities—if such a thing were in existence—where were they going to look for it unless to the Members of The Institution? If their mode of doing work was not the London system, where was it to be found?

To take an instance—he would not go outside the work of Members of The Institution—the cubing of 1½-inch ridges. Was it proposed to ask the provinces to adopt that? If so, he was not prepared to go with them.

To take another instance—the London measurement, referred to in the Paper, of digging excavations for

basements—it appeared to be the system of at least one Member to take the net size of the brickwork shown on the basement plans without allowing for the spread of footings or concrete, or giving the battening and strutting. He thought it would be time to ask for the assimilation of quantities when there was one fully recognised system of taking them.

He was endeavouring to guard himself against infringing Rule 61, but he thought he must put it to the meeting that they were faced with these alternatives: Either surveyors of the present day had not found the examinations good enough to prove them competent—he was speaking of a large number of men now practising in London, surveyors and Members of The Institution—or they had passed into The Institution without any examination and could not have passed the proper examination, or further—and this was worse—being competent, they were scamping their work because they were underselling their profession, and could not give such time to the work as was necessary to do it properly. The fourth alternative was even worse—that a class of man existed who used the letters "F.S.I." to obtain work, and when he got it did not do it himself, but farmed it out to incompetent men. He would say again that assimilation must begin by putting their London house in order, and when The Institution was ready to take steps in that direction it would be found that members of the Quantity Surveyors' Association would be ready to co-operate.

Mr. C. JOHN MANN (Fellow) said he was sure that

all present would agree with the expressions of regret that the author of the Paper had not been spared to be present that evening. The subject, as Mr. Steward had said, was not a new one, for the assimilation of the practice of quantity surveyors had often been contemplated and its possibilities discussed.

The thing itself was undoubtedly very desirable if it could be properly done; but he feared it would be very difficult to accomplish, and would lead to a very great deal of trouble in cases where it was necessary to make important alterations before London and provincial methods could be made identical.

It would be conceded, he thought, that the London method was, on the whole, more precise, suitable, and satisfactory than the provincial methods for general use, and he thought it would be for the provinces to assimilate their systems to the London methods rather than that the London system should be altered to meet the provinces.

There were undoubtedly points on which it would not be difficult to adopt generally the methods of the provinces, and he, for one, would be very pleased to join with his professional brethren in discussing any desirable alteration in that direction. He certainly thought that the measuring of angles to form reveals should be considered; but he would not care to adopt the system of measuring voids. He remembered that the late Mr. Schofield used to put an item in his bills of quantities: "Reduced brickwork in mortar in openings." That was a very confusing sort of item, and did not, he thought, convey much real information to the builder as to the proportion of reveals he had to provide for.

In his own practice he had recently been asked to

make it clear in bills of quantities what a rod of reduced brickwork was, and had billed the brickwork in a job in the North in yards superficial 9 inches thick, adding a note "45½ yards superficial 9 inches thick "equal to a rod of reduced brickwork." He believed that it would probably be a case of the "survival of "the fittest" in these matters, and he ventured to think that provincial surveyors would come gradually to adopt the methods now found most satisfactory in London.

Mr. GEORGE CORDEROY (Fellow) said he would like first to associate himself with the President's expressions of sympathy with the reader of the Paper in the circumstances which necessitated his reading it. He had not the advantage of the late Mr. Leaning's acquaintance, but had presented copies of his works to his pupils, and with these admirable books in his mind, he could not altogether associate himself with Mr. Gate's objections to text-books, which, he thought, had their use, though, of course, practice could not be founded entirely upon them. While he did not wish to digress into the subject of the professional education of surveyors, which he clearly understood to be out of order, he might say, with regard to the Examinations, that though they could not be regarded as a substitute for office training, they were a stimulus, and a valuable stimulus, to pupils properly trained.

The difficulty of keeping out the man who was crammed was common to all professional examinations. Pupils were not all equally intelligent, nor did

they all work equally well, and it was not to be expected that, in any large body of professional men, all would be found to be of equal ability and standing. The great thing to be looked to was character, which was the real guarantee for good and honest work.

He had great sympathy with the writer of the Paper, for he remembered that once, in an unguarded moment, he had suggested that a very interesting and useful Paper might be written upon "Customs of Measure-" ment." He was consequently pressed to undertake it. When he attempted it, however, he found that it would take much more time than he was able to afford, and he was compelled to abandon it. He would venture to ask Mr. Steward if he would be good enough to add to the store of information at the disposal of Members by placing in the Library of The Institution, for reference, the statement of comparative stone-work measurements to which he had referred.

The question touched upon by a previous speaker, namely, the uniformity of the unit of measurement, was not in his judgment of much importance. He thought measurements should be adapted, as far as possible, to the locality where they were to be used and the generally adopted unit there.

It had been his fortune to have to do with the preparation of quantities for many localities, and even, he might say, in many lands. He had occasion once to do some work in Spain, where it became necessary to use the metric system, and although it was at first looked upon as a difficulty, he came to the conclusion by the time the work was finished, that if the metric system of quantities could be adopted in

England, the greatest advance would have been made which the generation had seen, and if The Institution could do anything to make the metric system general in this country, they would confer a blessing, not only on themselves, but on the nation at large.

He thought it should be made perfectly clear in the bills of quantities what the measurements included, and that there should be in all bills, especially of work going out of London, a preamble as to the method of measurement, as well as that relating to the materials and description of work, to which the Paper referred.

He had found it an advantage in preparing bills of quantities, especially in connection with large and important works, to state clearly what method it was intended to adopt, and he thought all surveyors should be clear as to the method they were adopting in connection with any particular work. Personally, he agreed with Mr. Steward that the work of attempting any uniform standardisation of bills of quantities, as suggested by Mr. Northcroft, would be so great as to be beyond the powers of not only any one man, but any combined body of men. If a standard bill were ever written it would require so much skilled interpretation that he ventured to think it would lead to more arbitrations than anything any surveyor or body of surveyors had ever done.

One fundamental point referred to in the Paper, from which he differed altogether, was the suggestion that the methods of measurement should follow the practice of the merchants. He referred to page 224, where the author said, "In London, our units of measurement are mainly "referable to the way the merchant charges the material

" or the way the mechanic is paid for labour only." He ventured to say that London units of measurement had no reference to that at all. The surveyor was not concerned with the material until it had left the merchant's hands and got into the hands of the builder or contractor.

He thought that many mistakes were due to over elaboration of quantities by inexperienced surveyors in dealing with the question of waste in buying the materials, which would be better left alone. The surveyor could only deal with the actual finished work as wrought into the building, and must measure the work as put into the building itself, and not the material before it was actually brought into the work.

To the statement in the bill of quantities, " All " quantities taken net," there should be added, " unless otherwise stated," for there were certain items in 99 bills out of 100 which were not taken net—for instance, the thicknesses of joinery and in carpentry, deals and battens—and were not expected to be so taken.

As to waste, he had been trained by a surveyor who followed the practice which Mr. Steward had advocated of setting out actual waste in connection with works, and he was trained to make those variations in slating and boarding and timber to which he referred. He thought the true principle to adopt was that unavoidable waste in connection with the building should be included.

This could only be determined by a skilled surveyor, but, seeing the differences in practice, he thought there was all the more necessity to clearly describe the system of measurement and to see that one actually measured

the unavoidable waste in a building as distinguished from the avoidable waste.

The methods of measurement followed by London surveyors and country surveyors, and the differences which arose in connection with those measurements, had, in his opinion, largely resulted from the systems of piece-work measurement adopted by builders in paying their workmen and sub-contractors.

The general contractor of the present day was quite a new thing. He happened to have in his office a dimensions book of 1796, in which he found that very much the same system of measurement was adopted with regard to slating as was general in the present day, and he was sure if the evolutions of the different methods of measurement were studied, it would be found they had arisen from the payments for piece-work and the sub-contractors employed. Those methods had, no donbt, been classified and solidified, but were, he believed, at the root of the present practice.

There was a certain evolution also in methods of measurement due to the introduction of labour-saving machinery and improved methods of manufacture. Most of those present would remember the time when it was the custom, and the necessary custom, to take out materials and labours on iron roof trusses in very great detail, but at the present day he thought most surveyors differentiated between the actual roof trusses or riveted girders as manufactured at the works and brought on to the job, and the fixing labours which were done on the job itself.

Comparing the bills of the present day with those of the time to which Mr. Gate referred, there would be

found a great difference, but neither was necessarily wrong. The bills of 40 years ago were suited to their own times as were those of to-day to the present time.

Then again, dealing with the question of assimilation or standardisation, which always interested surveyors, and himself among the number, he had tried in his practice to introduce standardisation and assimilation in his own office. He had compiled, with the aid of his most efficient assistants, a memorandum for the use of his staff and those who assisted him, and he found it of considerable value up to a point, but at last he had to give up using it, for it was quoted against him on every conceivable occasion by many who made mistakes in using it through sheer lack of experience, and he therefore locked up the document and kept it for private reference only.

That brought him to his final point, which was that quantity surveying, as a profession, required skilled interpretation, and standardisation of the kind suggested by some speakers would possibly result in the employment of some intelligent lithographer to get out, with a little technical assistance, an abstract of items in a building, and would tend, it seemed to him, to the production of a still worse description of bills of quantities than some of those to which reference had been made. He did not think there could ever be a uniform standard of method, though benefit might arise from comparing notes of the special methods adopted in special cases.

Reference had been made by Mr. Chatfeild Clarke to the advantage of dealing with a building floor by floor. No doubt, while it was an improper way to deal with new buildings, in certain circumstances which would easily

suggest themselves to surveyors, it was practically the only way of dealing with extensive alterations and works of reparation.

Experience, common sense, and training must be used by the surveyor exactly as they were by other professional men, and he must adapt the skilled knowledge he possessed to the interpretation of the broad problems set before him.

THE PRESIDENT said he was sure he expressed the feeling of the Meeting when he said they were glad to have had such an excellent discussion on Mr. Leaning's very practical Paper. He did not himself profess to understand that particular work, but it was evident that Members connected with that branch of the profession had appreciated the Paper. He would suggest to Mr. Leaning that, as the hour was now too late to deal with the various points raised, he should communicate his reply to the next part of the *Professional Notes,* in which it could appear in a concise form for reference.

The vote of thanks having been put to the Meeting and carried unanimously,

Mr. LEANING, in reply, said it was very gratifying to him, personally, to be asked to read the Paper, which dealt with a subject to which his father had given very

considerable attention. He was pleased to have been the means of bringing before The Institution a matter which he felt to be rather pressing in its importance, and he would be very glad to reply, as far as he was able, in the *Professional Notes*, to the questions that had been raised.

The Meeting then adjourned.

PAPER 318.
No. 495.

# THE MEANS OF LOCOMOTION AND TRANSPORT IN LONDON.

BY WILLIAM WOODWARD (FELLOW).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, March 12th*, 1906.

GEORGE LANGRIDGE (Vice-President) in the Chair.

On Monday, February 22nd, 1886, just 20 years ago, I read before The Institution a Paper entitled "London "Remodelled," and I must ask permission to refer again to one of Disraeli's favourite ideas, which I then quoted, that "London ought to be the most magnificient city in "the world—a model for all other cities." When some one objected that his plan for a regenerated London would cost £200,000,000, and convert every ratepayer into a porcupine, he answered, "We may have to pay "£500,000,000 in the end for doing things in the present "way, and as to the porcupine, he is manageable enough "if you handle him in the right way."

## THE CONSERVATISM OF LONDON.

"Doing things in the present way" is a favourite axiom with Englishmen, and more especially with Londoners. When foreign nations have adopted various

municipal improvements, and our own large provincial towns have been bold enough to imitate them, London and its legislature will, after a few years of goading on, begin to examine, will appoint "commissions," Royal and otherwise, and, having succeeded in expending about as much money and time in "inquiry" as would have been sufficient to carry out an improvement, the richest metropolis in the world will make a start.

In just glancing through the discussion which arose on my Paper, I cannot ignore the fact that many of my ideas were considered "too fast." I was a Revolutionist of a somewhat malignant type, and the plans which I then exhibited evoked good natured smiles at the quixotic boldness of the young man who read the Paper. But I find two or three at least of my suggested improvements practically finished to-day—one, a "new "street from Charing Cross, in a line with the Strand, "through to the Mall, St. James's Park"; another a "new street from Holborn (at Little Queen Street) to "the Strand and on to Waterloo Bridge, and northwards, "widening Southampton Row to form a north-western "communication"; another a "widening of the Strand on "both sides, and also Fleet Street, through to the new "square of St. Paul's Cathedral"; another the "removal "of a block of buildings between Charles Street and "Great George Street, on the west side of Whitehall." My drawings also showed subways for sewers, gas mains, water mains, and space for telegraph and telephone wires.

### The Appointment of a Royal Commission.

Many of our Members, however, saw clearly, even 20 years ago, that the time was approaching when some-

thing must be done to relieve us from the serious loss of time and of temper resulting from the great increase of vehicular traffic in London. Indeed the congestion had, a few years ago, become so great and so pressing that a Royal Commission was appointed to consider the subject. The Report of this Commission, with the appendix, include a vast amount of information and evidence, to which I desire to direct your earnest attention, and in the consideration of which my Paper will be chiefly occupied.

The Royal Commission, appointed under His Majesty's Royal Sign Manual on the ninth day of February, 1903, consisted of:—Sir David Miller Barbour (Chairman), The Right Hon. Earl Cawdor, The Right Hon. Viscount Cobham, The Right Hon. Lord Ribblesdale, The Right Hon. Sir Joseph Cockfield Dimsdale, Sir John Poynder Dickson-Poynder, Sir Robert Threshire Reid, Sir John Wolfe Barry, Sir Francis John Stephens Hopwood, Sir George Christopher Trout Bartley, Sir George Stegmann Gibb, Mr. Charles Stuart Murdoch, Mr. Felix Schuster, and Mr. Lynden Macassey (Secretary). The Commission were commanded to inquire into the means of locomotion and transport in London, and to report:

"(A) As to the measures which they deem most effec-
" tual for the improvement of the same by the develop-
" ment and inter-connection of railways and tramways
" on or below the surface; by increasing the facilities
" for other forms of mechanical locomotion; by better
" provisions for the organisation and regulation of
" vehicular and pedestrian traffic, or otherwise.

" (B) As to the desirability of establishing some
" authority or tribunal, to which all schemes of railway
" or tramway construction of a local character should be
" referred, and the powers which it would be advisable
" to confer upon such a body."

## The Appointment of an Advisory Board of Engineers.

The above-mentioned terms of reference show that the Commission had determined to attack the matter in a broad and comprehensive way—and, appreciating the fact that the subject was one for practical treatment, they, on January 29th, 1904, appointed an Advisory Board of Engineers consisting of Sir John Wolfe Barry, Sir Benjamin Baker, and Mr. William Barclay Parsons, to report to the Commission on the matters set forth. The Chairman of the Advisory Board was Sir John Wolfe Barry.

## The Extensive Nature of the Report of this Advisory Board.

The Report of this Board, made last year, is really overwhelming in its vast array of statistics, plans, and recommendations; in fact, I am afraid that the great labour and skill bestowed on the Report has rather tended to hide its practical conclusions, and to relegate to some future period works of relief which should be undertaken at once. At times one feels as if one could not see the wood for the trees. If, however, this evening, we can revive and perhaps accentuate the great interest which should be kept up in a subject which so deeply concerns every Londoner, and if, in addition, we can add to the Commission's views or suggest some other practical, and yet not too costly, expedients for at once relieving the strain upon our metropolitan thoroughfares, we shall be doing good to millions of our fellow citizens.

## The Present Impracticability of providing New Thoroughfares in London.

If, in the course of my remarks, I differ from some of the conclusions arrived at by the Advisory Board, it will be understood that it is not because I do not really grasp and appreciate the results of their labours, but because I think the relief now sought for is *immediate*. It is all very well to say that the subject is so great that it must be tackled in a great way, and that any scheme or schemes adopted must provide for the wants of posterity, but, bearing in mind the loss and inconvenience which we now suffer, and that the cost of relief is to come out of our own pockets, I feel disposed to agree with the man who said, "Let posterity look after itself, "it never did anything for me, and I don't intend to do "anything for it."

Of one thing I think, we may be certain, that neither the legislature nor the London County Council will further the immediate pulling down of any large area for the purpose of forming new streets, or of widening existing ones to any considerable extent; and it is therefore to the present plan of London we must confine our attention, much as we should, of course, like to make London streets useful as well as beautiful.

## The Present Unlimited Liberty of Drivers and Others.

The first thing which occurs to every one who takes the least notice of reasons for stoppage of traffic in London, is the absolute freedom with which any person who likes may do what he likes to impede progress. We find borough councils, for example, opening up road-

ways where and when they like, giving no thought whatever to confining the area of their work to only the really necessary dimensions, allowing their workmen to idle away their time, and waste the ratepayers' money in gross delays, mostly due to want of real supervision. We find the water companies (now the Metropolitan Water Board), the gas companies, the telephone companies, the tube railway companies, &c., all exercising the same freedom, and permitting the same laxity. Months instead of weeks are occupied in necessary interference with traffic, three times the area required is enclosed, and the larger part of the expenditure wasted, the idle workmen grinning, as I have so frequently seen them, at the irritation they are causing to men to whom time is of the utmost importance.

The drayman, the market gardener, and the driver of a brick cart are allowed to crawl along just as they please, to occupy any particular part of the road which takes their fancy, and so to obstruct the busiest thoroughfares in London. There does not appear to be any constituted authority, who should be able to put matters right in two minutes, by getting hold of the horses' heads and turning them and their drivers into a side street—at all events out of the way—to make them accelerate their speed, or to keep them to the required part of the road.

Covered vans are also a serious nuisance in the streets. I believe an Act was passed to compel them to have side windows in the covers, but this Act seems to be more honoured in the breach than in the observance.

### Obsolete Vehicles to be dealt with.

Again, the present vehicular traffic is to a large extent obsolete and mischievous. The antiquated

wooded trundlers which are known as "omnibuses" crawl a few yards, stop as long as they dare, and, redolent with vile odours of cheap oil, contribute to the block of the main thoroughfares. Motor 'buses, which, like the motor-cars, appear to have come to stay with us, may in time drive the omnibus companies into burning the said wooden structures, reserving the lamps (which one sees agile young men transfer from way-side repositories to the anxious conductors) for museums, as specimens of British industry at the beginning of the 20th century. There can be little doubt that these omnibuses will shortly have to be dealt with by the authorities, and the comparatively innocent, but equally "crawling," vehicles, known as "four-wheelers," will pass away by effluxion of time.

### Tramways.

To my mind the most important part of the subject we are dealing with is the question of *tramways*. Should they be retained and perpetuated, or should their future use be immediately prohibited, and the present trams gradually removed from certain roadways? My own view is that the legislature should at once, if it has the power, stop all proposed fresh expenditure by the London County Council and others, on tramways and shallow subways. I include in this category both electric and horse trams. The County Council at present owns 48 miles out of the 54 miles now within the Administrative County of London, and enormous extensions are proposed.

Of course I do not suggest that the electric trams in outlying districts should be at once dealt with, but I do suggest that, wherever in the inner-circle of London motor 'buses are likely to compete with tramways, the tram-

ways should go. Parliament should at once step in with a short Act and prevent the enormous contemplated outlay, which the London County Council has before it from being made. It should stop all proposed contracts both as to subways and trams, and see what effect upon the traffic of London the new motor 'bus will have. The Advisory Board of Engineers sum up (pp. 72 and 73 of their Report) the extent of the tramways in operation—and the figures are sufficiently startling—thus "There "are in the 'Southern Section' already about 72¾ miles "of tramway in operation, 31½ miles by horses and 41¼ "miles electrically, while 51 miles in addition are "already authorised." In the "Western Section" "37 "miles are already working, and 45 miles more are "authorised, making 82 miles in all" the whole of the lines in operation are worked electrically, with the exception of about one and a half miles between Kew Bridge and Richmond, on which horses are used. In the "Northern and Eastern Sections" "there are at present "93½ miles of tramway in operation, of which 62 miles "are worked by horses and 31½ miles by electricity. A "further length of 51¼ miles has been authorised, and "numerous extensions are proposed."

Thus the total of the three sections is 203¼ miles of lines in operation, 146¾ miles of lines authorised but not yet built, making a grand total of 350 miles.

The Advisory Board of Engineers point out the defects of the London tramways to be "insufficient "mileage," the stopping of existing lines short of "points "of destination," and "dead-end terminals setting up points of congestion in the streets." The Board proceed to deal with these obstructions by the suggestion of "proper extensions" (p. 78), and in a very careful consideration which they give to the whole subject of tram-

ways, find that the evidence points to extension rather than to staying the hand. These experienced gentlemen, with all the information which could be gathered at their disposal, have not overlooked the fact that there may be alterations required by "local conditions on "different routes," and by the "diminution and regula- "tion of other traffic on such routes to be expected from "the introduction of tramcars." They point to the probable diminution in the number of omnibuses, and, after referring to other vehicles which now congest the streets, they state, limiting their remarks to the effect on the streets, that "as to the general advantages to "London of tramway facilities we have no doubt."

But in the next paragraph (on p. 87) the Advisory Board very properly refer to motor omnibuses, and state that many of the views expressed as regards horse omnibuses would have to be considerably modified "if a "comparison has to be made between electric tramcars "and motor omnibuses, the future of which is at present "uncertain;" and they go on to say that "the tentative "working in London of motor omnibuses within the "past twelve months distinctly indicates that a rate of "speed can be practically maintained by them which "compares not unfavourably with the speed of electric "tramcars in similar thoroughfares. We find also that "the present small number of motor omnibuses in "use on the streets of London is to be augmented "materially." This important admission is much strengthened by the evidence of Mr. J. L. Pound, the Chairman of the London Omnibus Owners' Federation, who expressed himself before the Royal Commission as "hopeful, and even confident, as to the successful intro- "duction of the motor omnibus in London, and of its "being able to compete with the electric tramcar."

This opinion of a gentleman so thoroughly versed in the subject as Mr. Pound undoubtedly is, would be, to my mind, a complete justification for the County Council at once staying its hand as regards the purchase or the laying down of any new tram system. I feel that I cannot be too insistent on this grave matter, and I regret that the Advisory Board have not, with the views they have already expressed, made it perfectly clear that pause should be given before such vast expenditure is incurred as is now determined upon by the County Council. It is true that the Board further say (p. 87) that the time has not, in their opinion, arrived for a definite judgment on this question of motor omnibuses, but they unfortunately go on to say that "whatever may be the "eventual result of the rival systems," *i.e.* motor 'bus *v.* electric tram, the recommendations they have made as to routes and similar matters, including the widening of streets, "will remain unaltered." I feel certain, however, that the views of the ratepayers of London will not remain unaltered, and I would venture to point out to the Advisory Board that, if the contention that the motor 'bus is *the* mode of transit for London proves to be the correct one, the whole fabric of the contemplated enormous expenditure on tramcar routes and tramcars falls to the ground with a crash.

Those who go down to their destinations in horse "trams" are usually persons endeavouring, at a cheap rate, to while away their time. We regarded the advent of these cars with favour, and we, the public, are beginning to see that their demise should be near at hand. Not so, however, the London County Council. That conservo-progressive body are proceeding, with admirable courage, to perpetuate trams.

I observe in *The Times* of the 7th inst. that the

Highways Committee of the London County Council have accepted tenders amounting to *£141,399* and *£238,045* for roadwork in connection with the reconstruction for electrical traction of the first section of the northern lines, the branches between Shoreditch and Stamford Hill and between Bloomsbury and Poplar, and there are several tramway Bills in Parliament.

We now know that permanent lines of undeviating rigidity are a mistake; we see that the elasticity of route possible with a motor 'bus is the right thing, and I think the sooner the County Council also grasp that fact, the better it will be for London traffic and for London ratepayers.

I must ask you to allow me to devote a few minutes to the most recent work of the London County Council with reference to the intended perpetuation of tramways.

## The New Shallow Subway.

At the junction of Southampton Row with Kingsway, the London County Council has debouched a shallow subway for the purpose, I understand, of continuing the trams coming from the Angel at Islington through Kingsway as far as Aldwych, and onwards to points which I do not know. The opening formed for this subway occupies a surface area of 172 feet in length by 24 feet in width, which in itself forms an obstruction to the traffic. The construction of this subway has entailed a very large expenditure, and we shall do well to closely scrutinise the benefits which are expected to arise. In *The Times* of the 26th February, 1906, it is stated that the estimated cost was £279,000, but what the *actual* cost has been we do not know.

This shallow subway is about 14 feet high from the roadway to the roof, and has a width of about 20 feet. Electric trams now run from the Angel to Aldwych for 1½d., and the time occupied is about 10 minutes. These trams run in the open for the greater part of the distance, and they have been constructed without any top or outside seats. This, to my mind, is a very great error. In the first place the shallow subway could easily have been made a little deeper so as to take cars with inside and outside passengers through it; next, smoking cannot be indulged in, and the pleasant summer outside ride is lost; and thirdly, there is a great loss in the number of passengers carried by each car. A large electric car, such as those running between Shepherd's Bush and Hounslow, carries inside and outside a total of 69 passengers, those at Westminster Bridge carry 54; and the Middlesex County Council electric tramcars from Highgate to Whetstone carry 68. A North Metropolitan horse car carries 38, whilst those just constructed for the shallow tunnel carry only 36 passengers, a loss, compared with some of the cars above mentioned, of 32 passengers per car. The height of a car with seats on top is about 8 feet 6 inches from the roadway to the roof, and if we allow 6 feet 6 inches for a man standing on the top of the car, we get 15 feet as the required height, and as the shallow subway is about 14 feet from the pavement to the roof, it only required an extra depth of a foot or so to allow it to receive trams with inside and outside seats. This is a most regrettable oversight from all points of view, and it is to my mind inconceivable how such an expensive want of forethought could have arisen. It will be, of course, quite impossible for these trams to successfully compete financially with motor 'buses, and the delay in transit caused to the large number of persons

who will have to wait for accommodation in the new cars will certainly not help London locomotion.

I have ridden in one of these cars from the Angel to Aldwych, and although the gradients are not quite so easy as one would desire, there is no great inconvenience caused to passengers.

A picture of what tramways can do to impede traffic may be seen at almost any time in that much used thoroughfare, Theobalds Road, which was designed to relieve traffic, but which is now blocked so frequently by cars, themselves designed to relieve traffic.

I think it will be agreed that the County Council, in dealing with public funds, should go to work on lines similar to those of any well organised and well managed private trading concern, and certainly no prudent private firm would continue projects which appear likely to be shortly superseded by later inventions. We must, therefore, hope and trust that the Council will stay its hand as regards these shallow subways and the trams generally.

But further than this, I am afraid it may be concluded that the London County Council having once made up its mind to keep the trams alive by means of these shallow connecting tunnels, the idea will be persisted in to the bitter end; and I venture to say that millions sterling of the ratepayers' money will be ultimately wasted upon a scheme which is bound to impede rather than to accelerate the movement of London traffic.

But this is not the only struggle we may anticipate from the resolve of the County Council to stick to its now antiquated guns. Our bridges and our Thames embankment are practically doomed. Tram lines will be insisted on as certainly as they must ultimately be removed. The serpentine power of a motor 'bus is

bound to kill the rigid lines of the tram, and the speed of the electric tram, even when the hideousness of overhead wires is supplanted by the conduit system, will be equalled by the power of the motor to select its own route, and when the streets have been relieved of the monuments of antiquity to which I have before referred, the time occupied from point to point will be correspondingly reduced.

## The Blackwall Tunnel.

I am not enamoured of the engineering skill of the London County Council. I am not disposed to go into raptures over Vauxhall Bridge, with all its early and very costly blunders, and I must confess that after one or two rides through the Blackwall Tunnel, I am not deeply impressed with the Council's skill in roadmaking. The paving selected is of the noisiest, the camber of the roadway is far too great, the walls and arch are lined with white glazed bricks, and the total result is the most deafening, ear-splitting noise which it is possible for the ingenuity of man to create. If I ever contemplate suicide, and cannot quite make up my mind for the task, I shall ride through this Blackwall Tunnel say once a day for one week, and, at the end of that period, I am perfectly convinced that my mind will be quite made up, and I shall proceed to enjoy, for a few minutes, the quiet waters over that tunnel before taking the final plunge to alight upon the extrados of the arch, which I should anathematise with my last breath.

I particularly refer to this Blackwall Tunnel because I see that the Advisory Board have a suggested "Tower "subway" for the proposed tramway from Leman Street, passing under the River Thames, and I trust

that the errors in the Blackwall Tunnel will be avoided in this new subway.

### City Impediments to Traffic.

As a little relief to the picture I have just drawn, let us get back to impediments to transit which can be, if not entirely, certainly to some extent, removed. I may say here that the Commissions, whose Reports we are dealing with, have in the closest and most painstaking manner pointed out the defects and the remedies which might be applied.

Take, for example, the City between five and seven o'clock in the evening. Just at the time when the general vehicular and pedestrian traffic is at its height, the business houses are permitted to load up waggons and carts to their hearts' content, with results fatal to rapid progress. Of course goods must be got off, but why not restrict this getting off to the early hours of the morning (as brewers' rope and barrel delivery) is up to, but not beyond, 10 a.m. and not before 7 p.m.? How frequently one sees in the City drivers of waggons and carts quietly conferring with each other upon the topics of the day, and afterwards quenching the resulting lip-dryness with liquids from the nearest "pub," while other users of the road are blaspheming greatly, and with sufficient reason.

Again, why should not empty cabs be made to give way to engaged cabs? I know that the difficulty of doing this seems too weighty, but I believe it can be met. There must be free and ample power given to the police to deal promptly and summarily with all recalcitrants. They do it wonderfully and effectually at the holding up points, and they could do it equally well *en route*. But I would make a further suggestion in connection

with the police. At the present time they have power, but they do not exercise it, to deal thus summarily with obstructionists. The circumlocution of police court summonses is of no real service; a fine or a caution is all that is administered, and the offender departs only to renew his little escapades when he feels so disposed. "Turn him out of the way first, and fine or imprison "him after," is the only business-like method.

THE APPOINTMENT OF SPECIAL TRAFFIC CONSTABLES.

The Advisory Board of Engineers refer very properly to the evil of having lamp-posts, &c., in the roadway. The evil may be seen at any time in the Euston and Marylebone Roads, where the "blow-holes" of the Metropolitan Railway constitute a constant interruption of the traffic. It is to be hoped that when the complete electrification of this railway is effected, most of these "blow-holes" may be covered in and the roadway reinstated.

Bearing in mind, too, the vast importance of this traffic question, I think the legislature would be quite justified in appointing special mounted traffic policemen, armed with full powers to deal summarily, on the spot, with all persons, who, in their judgment, impede the traffic; and it would be well to provide them with special uniforms, so that their aid could be invoked without loss of time. Of course these special men need only be employed in the busy and congested thoroughfares of London, and they should be under the control of the present police authorities, or of the proposed new Traffic Board.

Other obstructions to traffic are the street refuges, although I do not see how they can well be removed

without incurring danger in crossing wide thoroughfares. In some streets they occur too frequently, and in others they could be entirely dispensed with. In watching the effect of these refuges we can see how frequently their presence impedes, and how much injury they do to locomotion.

There must, too, be much laxity somewhere in permitting certain persons to take up more than their share of the street areas for carts and waggons. Parcel delivery offices, and music halls and theatres at once suggest themselves as instances of this. Or take, for example, the surroundings of Covent Garden Market. The tenants of His Grace the Duke of Bedford, and traders at the market, appear to be able, with impunity, to block up the roadways surrounding the market proper, and to extend the nuisance to the surrounding thoroughfares without any regard for the rights and privileges of the general public.

### Unjustifiable use of Public Footways at Theatres, &c.

Another little relief may be secured by "moving on" pedestrians at points where they obstruct the traffic. At places of public resort we all know how exit is impeded on ordinary occasions by the crawling propensities of the British public. The first to descend a staircase or to use a corridor should be hastened on, and thus a theatre or a music hall could be emptied in half the time now occupied. But no, the "laisser faire," the "dolce far niente," the lifelessness of the average Londoner must go on unmolested, and traffic must suffer accordingly.

Then look at the, to me, unaccountable way in which visitors to theatres and music-halls are allowed

to occupy the footways while waiting to get in to these places of amusement. If a bookstall projects a few inches over the footway in Charing Cross Road the owner is summoned at the police court, but theatre and music hall proprietors may for hours occupy nearly the whole of a long length of footway for their visitors, while ordinary passengers are driven into the roadway at considerable personal risk. The traffic, both vehicular and pedestrian, is impeded, and all because the authorities, who are so keen in other matters will not compel the proprietors either to open their doors earlier or to face some action taken to prevent obstruction. I see in *The Times* of February 24th last, that the Westminster City Council summoned a firm for obstructing the public highway with an awning from a house in Eccleston Square, which awning was supported by uprights let into the footway. The Westminster Council swallow thousands of yards of footway, but jib at two small holes in the kerb.

### Suggested Reliefs.

One relief could, I think, be afforded if motor 'buses were compelled to stop only at defined stopping places. These could be arranged at frequent intervals, and passengers would soon accustom themselves to get to these stopping places as they do in the case of electric trams. The frequent pulling up of 'buses disturbs and impedes the traffic, and relief would certainly be afforded if these the only stopping places were insisted upon.

### Construction of Roadways.

The formation and construction of roadways must always be an important element in this traffic question.

I have already referred to the Blackwall Tunnel as a modern example of excessive camber, and the Advisory Board of Engineers of course fully understand the mischief that arises from this over-cambering. The drivers naturally keep to the centre of the roadway as much as possible, and hence the blocking which would otherwise not occur. "Uniformity of material" is another matter which has a bearing on the subject. Macadam, asphalte, granite pitching, granite cobbles, and wood of various kinds crop up in a single mile of roadway; some of it is well-laid on good foundations, some is not; some of it is always under repair, some is repaired and finished off with what is euphemistically termed "hoggin," which material is converted into mud after it has been subjected to a few days' traffic. Some of the granite pitching has become "polished granite" by effluxion of time; some of the wood is "hard," and some is not; and some surveyors know how to construct a macadam roadway, and some do not. These various little matters necessitate more frequent repair and attention, and hence traffic is unnecessarily impeded.

Again utter want of common sense and ordinary care on the part of constituted authority will permit steep gradients in roadways to be quite unattended in slippery times, and when half-a-dozen poor horses have fallen and the traffic has been stopped for a time, a cartload of sand or gravel will be sent to the spot—where it is perfectly well known danger exists—under the charge of perfunctory workmen who take as long to spread it as their masters did to think of it.

### Railways.

The Board has devoted considerable attention to

railways, but time will not permit me to refer to that particular branch of the subject as it broadens too much the area of my Paper. I would, however, like to say that, if I were the authority wielding any powers as regards railway companies, they should not be allowed to pass a single fresh Bill until they had made their stations decent, and their carriages sufficiently lighted to enable travellers to read. The sanitary condition of many of the London railway stations is a standing disgrace to the companies and to the sanitary authorities, and I would point to the Holborn Viaduct Station of the South Eastern and Chatham Railway, which has not even a gentlemen's lavatory, but only a porter's wash basin, for the use of any passenger who desires a wash at the end of his journey, as an example of how a railway company can defy public opinion and disregard public convenience. To refer the traveller to an adjacent barber's shop for a wash is hardly consistent with the dignity of a company with a monopoly which should carry with it every regard for the comfort of its customers. Railway companies do nothing till they are absolutely forced to improvement by competition. When electric trams threaten their pockets they wake up, and when, as I hope will be the case, motor omnibuses still further threaten their interests, then perhaps they will do that which should have been done years ago as a matter of course.

A subject of interest to Members of The Institution is afforded by the Advisory Board on page 104 of their Report. The contract prices, 44 years ago, in the case of the Metropolitan Railway were, for excavation carried to spoil, 4*s*. The same item has cost, in the case of the shallow subway constructed by the County Council, 7*s*. 6*d*. Brickwork then cost 24*s*., it now costs

50*s.*, concrete cost 7*s.* 6*d.*, it now costs 16*s.*, and, as materials have not risen in value to any large extent, it follows that our friend the British workman, encouraged as he is in all directions, does his best to make new works of relief to-day practically impossible.

## General Observations.

Dealing now a little more closely with the Report of the Advisory Board of Engineers, we in this room claim some authority to appreciate or depreciate the conclusions at which they have arrived, and which have received the endorsement of the Royal Commission, subject to the observations of certain "dissentients," to which I shall hereafter refer. It will be quite impossible this evening to even touch upon many of the marvellous array of facts and opinions contained in the Reports, but there are some to which we must devote earnest thought and attention always remembering that I am proposing to deal with a present emergency, disregarding, for the moment, the great future, which the future must provide for. For that reason I leave the question of the proposed two great new avenues, one from east to west—from Whitechapel to the Bayswater Road—and the other, north to south—from Holloway to the Elephant and Castle, as well as the widenings and improvements indicated on Plan No. 8 attached to the Report. I only pause to observe that the Engineers suggest the linking up of these avenues with the tramcar system, and that as regards cost, a feature which they fully recognise, they look forward for some "recoupment" from buying more land than they want for the absolute avenues, and from some system of "betterment."

The Engineers refer to the fact that "Kingsway"

cost £4,800,000, and that the estimated recoupment is £4,000,000. The £4,800,000 has, no doubt, been expended, and I sincerely hope that all in this room will live to see the "recoupment." The cost of the "main "avenue" would work out at £15,550,00, or £3,110,000 per mile. The Engineers admit that this is a "very con- "siderable sum," and Mr. Stenning, who estimated the cost of the land, very wisely added that the "betterment" had not been "thoroughly considered." The Engineers with commendable lightness of heart, say that, formidable as the figures are, the expenditure should be "faced." One sentence in the Engineers' Report, which has reference to the widening of Euston and Marylebone Roads, I heartily endorse, and that is that, where public improvements must be carried out, proper compensation should be given for interference with such private rights as may exist.

One word as regards the proposed widths of new streets which range from 140 feet, house to house, for "main avenues," to 40 or 50 feet for "fourth class "streets," and that word is that wide streets entail correspondingly wide crossings, every foot of which increases the trouble for foot passengers; the Engineers would, however, no doubt vary these widths if tramways were abolished, as I think they should be. I may add, for the purpose of comparison, that Portland Place is 120 feet wide, house to house, and Northumberland Avenue 90 feet wide.

The Engineers, among other suggestions, propose a bridge across the Strand at Wellington Street, which seems to me a feasible and not too costly scheme. This is a point in London traffic where great trouble is experienced. The bridge should be well looked after as regards design. The one across Ludgate Hill effectually

mars the view of St. Paul's Cathedral, and the one proposed across the Strand may mar the view of the Church of S. Mary-le-Strand. Whilst on this point I shall, at the risk of being considered a vandal, again suggest the immediate removal of St. Clement's Church. It is architecturally and archæologically unworthy of retention, it mars the eastward view, and it is certainly "in the way."

## The Report of the Royal Commission.

If there is one thing which strikes one more than another in reading this Report, it is the evidence of enormous care and labour in the endeavour to grapple with the vast subject dealt with.

The statistics furnished respecting the housing of the working classes are very interesting, and we are not surprised to learn the heavy losses incurred by the County Council in their schemes. These losses must inevitably continue while labour costs what it does, and there cannot, therefore, be much inducement to provide accommodation in the central parts of London. We must look forward to the day when workmen will see the soundness of themselves working, and when it will pay to house them a little way out of London, and to provide rapid means of getting them to their homes.

On page 40 of their Report the Royal Commission treat us to a little "imperiousness" which one hardly expected. In speaking of building laws they say that "Special provision will be required to meet cases where "an undue proportion of the land devoted to building "would be required for the construction or improvement "of main roads, and that in such cases a fixed percentage "of the land proposed to be built upon might be set aside

"for new streets, without payment of compensation, "additional land, if required, being paid for at its "market value."

As regards tramways, the Commission, on the whole recommend their extension, and in this recommendation I think they have certainly made a fatal blunder. They are perfectly aware of the presence of the motor'bus, and of its certain increase; they quote the expectation that these 'buses will prove to be the most suitable form of vehicle for public street conveyance, and yet they think that "on "routes suitable for tramways where there is a large "traffic, tramways will continue to be the most efficient "and the cheapest means of street conveyance," and "they cannot recommend the postponement of tramway "extensions in London on the ground of any visible "prospect of the supersession of tramways by motor "omnibuses."

It will be well to note, in this connection, some of the new lines of tramway recommended by the Advisory Board, and if these are some of the "suitable routes" referred to by the Commission, I can only remark that I think the future will prove the inaccuracy of the conclusion. For example:—

(1) A surface tramway along Fulham Road and Brompton Road;

(2) A surface tramway along the Harrow Road, Westbourne Terrace, and Bishop's Road;

(3) A surface tramway over Westminster Bridge and along the Thames Embankment;

(4) A surface tramway passing along Queen Victoria Street, Cannon Street, Queen Street, and over Southwark Bridge;

(5) A surface tramway along the Farringdon Road;

(6) A surface tramway from Gray's Inn Road along Holborn and Charterhouse Street;

(7) A surface tramway along the Tottenham Court Road, Charing Cross Road, east side of Trafalgar Square, Charing Cross, Whitehall, Parliament Street, and Bridge Street;

(8) A surface tramway passing along Victoria Street, Broad Sanctuary, and Parliament Square.

There are other routes suggested by the Board, and set forth on pp. 45 and 46 of the Report of the Commission, but, if my audience will picture to themselves the network of trams, with all its accompanying evils, at Charing Cross, Parliament Square, Tottenham Court Road, Cannon Street, and Queen Victoria Street, I think they will arrive at the same conclusion as myself as to the fatal and costly blunders now staring us in the face.

An innocent looking little paragraph appears on page 47 of the Report of the Commission. It refers to "the Tower subway" of which I have before spoken. This is to be a tramway starting at Leman Street, passing under the river, and terminating at the southern approach to the Tower Bridge. If the short shallow subway at Southampton Row cost between a quarter and half a million sterling, I should like to know what this proposed "river subway" is likely to cost. However, in due course, the ratepayers of London will know what it has cost, as they will the price of a few other little municipal projects now occupying the fertile minds of London's rulers.

The Commission refer to some matters of detail, but in their "recommendations" there is this conclusive paragraph. "We recommend a large extension of

"tramways in London and the suburbs; that immediate "attention be given to providing through communica- "tion between the different tramway systems within "the Administrative County of London; across the "Thames by the Westminster and Blackfriars Bridges; "and that provision be made for through running inside "and outside the Administrative County of London."

With this conclusion I must respectfully venture to differ entirely, and I sincerely trust that, for the future welfare of London's traffic and with a little regard for the pockets of the ratepayers, a decided and effectual opposition may be at once started to prevent the consummation of what, I feel certain, will prove to be a costly error of the worst description.

### The "Veto."

At the present time the City and the Metropolitan Borough Councils have the right of veto as regards the formation of new tramways. The London County Council can use the same check as the local authority in order to defeat any other promoters, and with, I think, some unfairness, would like to see the right of veto abolished in the case of the local authorities, but "wishes to retain its right of veto against the private "promoter, and objects to submitting its tramway "schemes to a Traffic Board, preferring that they "should go direct to Parliament." Comment upon this would, I think, be thrown away.

### Dissentients.

In parting from the Blue Books, vols. i. and vii., I must refer to the Reports of Sir Joseph Dimsdale and Sir George Bartley, and the "note" by Sir George Gibb.

In a lengthy and most carefully drawn up Report, Sir Joseph Dimsdale sets forth his reasons for recording his dissent from some of the conclusions arrived at by his colleagues.

He naturally disagrees with the proposal to take away from the City the right of veto on new tramways. He points out the danger which would accrue, in the case of a fire in the City, if a breakdown in the tramway traffic occurred, as the engines could not of course get to the scene, and we might have another Great Fire of London. He strongly points out the objections to tramways in the City, and the dislocation of traffic which would result from their introduction. He further points out that the proposed new street running east and west through the City of London, 140 feet in width, would, if carried out, be disastrous to the City; and he finally counsels the "going by stages," and thinks that the better course would have been simply to have "recommended the creation of a properly qualified Improvements Advisory Tribunal, before which could be immediately laid the Report we have obtained from the Advisory Board of Engineers, and which tribunal should be empowered, and would be in a far better position, to deal exhaustively with the whole subject, and before whom independent evidence could be placed."

Sir George Gibb confines himself to a note on the tube and underground railways; he thinks that a railway from Shepherd's Bush *via* Kensington, Piccadilly, and the Strand to the City is required, and he "doubts whether it will be necessary to spend any further capital on railway construction within the central area for a period so long as not to be within the limits of practical consideration at the present time."

Sir George Bartley regrets that he is unable to sign the Report, and gives his reasons for his abstention.

He states that where tramways already exist the congestion is often as bad, if not worse, than before they were made; he concludes that the only effective solution for the congestion of the traffic in London, both vehicular and pedestrian, is the broadening of the streets and the creation of new great thoroughfares. He does not approve of the action taken in forming the Advisory Board of Engineers, whose Report, he thinks, does not profess to be more than the individual opinions of these gentlemen, and he cannot think the Commission is in a position to pronounce definitely on the proposals which their Report contains. Sir George is strongly against the creation of new surface tramways, and is of opinion that, in narrow business streets, they rather augment the congestion than relieve it, and certainly seriously injure trade in those thoroughfares. He has his eyes wide open as regards the competitive value of the motor omnibus, and thinks it "scarcely wise to extend tram-"ways in narrow streets, at a great cost to the public, "until more experience has at least been gained as to the "future of motor omnibuses." As regards the "veto," Sir George considers that "no local authority should "possess any veto, by which it has the power of pre-"venting Parliament from considering any scheme of "London locomotion."

These dissentient Reports deserve very great consideration, and I thoroughly agree with most of the views expressed by the three gentlemen referred to. It is a happy sign of the times that they have had the courage to dissent, and the fairness to give the grounds of their differences.

## Summary.

In this Paper I have endeavoured to place before you as briefly as possible, the general pith of the very great subject which is now uppermost in the thoughts of every Londoner. I do not claim any originality in the remarks I have ventured to make, for most of them occur in the Blue Books issued by the Royal Commission; but I do ask you to give careful consideration at all events to some of my conclusions, which are based on a half century's experience of a born Londoner, who has, as much perhaps as most of his fellows, taken a keen interest in the welfare of London, and who continues to watch, and criticise, with as much attention as ever, the grand possibilities of the greatest metropolis in the world.

I agree with the proposed immediate creation of a Traffic Board. The nature and constitution of that Board requires most careful consideration; but its powers should be correspondingly great; and the exercise of those powers should be of such a character as to render red tape unnecessary, and appeals to legal tribunals out of the question. It should, moreover, be thoroughly independent, and outside the control of the London County Council or of other constituted authority.

I warn the London ratepayer that he is in for a thorough and almost immediate and crushing expenditure on tramways, shallow subways, street widenings consequent thereon, and some other little accessories pertinent thereto. I would add that these tramways will, in my opinion, in the majority of cases, be taken up again in less than 10 years from the present time, as will those now existing, and I further opine that one reason why they will become obsolete is that they will be found to obstruct rather than to accelerate the traffic,

and the other is that the motor omnibus is the vehicle which will drive the tramways out of the field, and which, in its turn may be supplanted by modes of transit on the "wings of doves," or by some form of substituted flying machine. If it should prove in the future that "doves" will be the mode of conveyance, I trust the future Presidents of The Surveyors' Institution will be able to select their own particular dove, and that all the then Members will be equally independent of tram-cars, motors, cabs, or other of those lumbering vehicles which I have this evening thrust upon your notice.

Mr. A. R. STENNING (Fellow) said he had very much pleasure in proposing a vote of thanks to his friend Mr. Woodward for his excellent Paper on the all-important question of the traffic of London. There was in it, as in all Mr. Woodward's contributions to the *Transactions*, a vein of humour which brightened the subject and went far to add force to his points.

Most Members present had no doubt read extracts from, if not the whole of, the evidence given before the Traffic Commission. He had the honour to have been called to give evidence before that Commission, who certainly paid every attention to what a witness had to say. He thought a strong point in their recommendations was the sound advice they gave on the question of an Advisory Board being appointed to consider all the questions of London traffic.

The matter was one which impressed itself upon everyone's attention. One met it at every turn in going through the City of London: there were congested points where it was really a wonder how the traffic was managed. It was managed, and in a marvellous way, though even

so it was certainly not up to the demands of the twentieth century.

It seemed to him that the only body, which could really determine and advise as to the proper way of carrying on the immense traffic to be dealt with, would be a perfectly independent Board composed of persons quite outside the influences of ratepayers or the promoters of schemes, to advise and consider, on the broadest possible lines, what were the best means by which to overcome such a great and increasing difficulty.

He thought that Mr. Woodward had very wisely touched upon the question of tramways and the very near future in which they would be superseded by the motor omnibus. The rigid lines to which tramways were necessarily confined must and did impede the traffic to a very great extent. The motor omnibus carried nearly, if not quite, as many passengers as the tramcars, and was able to twist and turn about in a way that tramcars, of course, could not. He thought that tramways, outside a certain radius of London, were certainly useful, and if they could be brought in just far enough to deposit passengers at certain points where they could be transferred, by motor omnibus or the many tube railways now being constructed, to their destination, he thought this would be found to assist traffic in the simplest possible way.

He was unable to think that the joining up of the tram lines by way of Westminster and Blackfriars Bridges was going to make any appreciable difference to the traffic. It would destroy the beauty of the great Metropolitan Embankment, such as, he thought, no other city in the world could boast of, constructed at immense cost, partly contributed by private shareholders when the District Railway was made. If

ever that came to pass, as seemed probable in the near future, he thought many of the advisers of the scheme would live to regret that they had ever proposed it.

The speed of the traffic might, he believed, be greatly facilitated, as Mr. Woodward had suggested, by the removal of vans, and such vehicles, that stopped outside shops for a longer time than was necessary. He thought the police might direct heavy traffic into lines at the sides of the roads so as to allow light traffic to go much quicker than at present. One had only to look at the vast improvement which had taken place at the junction of Park Lane with Grosvenor Place, where the traffic-way had been widened, to wish that similar measures could be taken on the north side of the Park, by leaving the Marble Arch standing out entirely free from its surroundings, so that the traffic going from and to Park Lane westward would have a free run, and not have to cross the great traffic of Oxford Street and Bayswater Road. That improvement could, he thought, be carried out at a comparatively small cost.

As to whether new routes should be made, he must admit that he was in favour of the suggestion for a new broad thoroughfare from east to west. The idea was Sir John Wolfe Barry's, who had fully studied the question. It seemed to him a good one, though, of course, expensive. It must be remembered that the principal traffic went from east to west, and at the present time, except the Embankment, which could hardly be called a a direct means of communication, there was only the Strand and its continuations and, further north, the Marylebone and Euston Roads. He thought the suggested route from Bayswater to Commercial Road East would be a decided improvement. The cost of it would be great; but London, large and wealthy city as it was,

could surely well afford to pay for it, especially if the payment were spread over a number of years.

He believed also that there would be a considerable amount of recoupment. That was a thorny point to touch upon, whether one called it "recoupment," or "betterment," but he held that, when a new thoroughfare was made through a neighbourhood, those who had the advantage of frontage to it should pay something towards the improvement and the consequent enhancement in value of the property.

If such a thoroughfare could be made, it would relieve a great deal of the pressure, and something must soon be done in that way.

Another idea which struck him as useful and practical was an Outer Circle Railway, taking a radius of about 8 miles from the centre, and connecting the whole of the railways north of London, and thus enabling a large proportion of the goods that now came through London to be carried outside its limits. That would, he was sure, relieve the traffic in a great measure, and at the same time would open up a new residential country district. Tube railways must bring some relief to the traffic; but of course they were in their infancy and those at present in full operation did not, he thought, pay so well as to induce capitalists to put their money into similar undertakings. What was to be the value of the Baker Street and Waterloo line would be seen in a few years. Many other lines had been constructed, chiefly intended to take the people, who had to work in London, to live in the green fields instead of in the congested districts.

The whole question of London traffic required the most careful consideration. He fully agreed with many of the points that Mr. Woodward had made in his Paper,

and he was sure all present would gladly join in a hearty vote of thanks to him for having brought the matter before them in such a pleasant and attractive way.

Mr. HOWARD CHATFEILD CLARKE (Fellow) said it was with very great pleasure that he seconded the vote of thanks to Mr. Woodward, which he did most heartily and sincerely. He was old enough, he was sorry to say, to remember the reading of Mr. Woodward's Paper 20 years ago, when his (the speaker's) late father seconded the vote of thanks as he had now the privilege of doing. It came therefore to him as a still greater pleasure.

During that former discussion the expression "cloud "land" was applied to some of the great schemes which Mr. Woodward had the sagacity and courage then to advance, but many of those "cloud land" schemes had come down to mother earth and had been carried out, chiefly by that much abused body, the London County Council.

The great streets mentioned by Mr. Stenning appeared, perhaps, to be rather Utopian, and he thought Mr. Woodward had hit the nail on the head when he said that the question was one which must be dealt with immediately.

He agreed that much could be done by regulation. The omnibuses, or "old trundlers" as Mr. Woodward called them, were a source of great trouble, and on page 83 of their Report the Commissioners agreed that some regulation was in their case essential.

If a strong Traffic Board were established, surely such an absurd thing as allowing omnibuses to run down Bond Street and New Bond Street, and streets of that description where they had alongside them wider and better streets, such as Regent Street, would be stopped:

but those were questions which were rather matters for police regulation.

Then, again, in Oxford Street at 4 o'clock in the afternoon, one saw four-horse teams drawing Great Western trolleys to Paddington and blocking the whole of the traffic. Surely that also should be a question of some regulation, which would leave the main arteries, like Oxford Street, for the quick traffic. The same trouble existed in the City, where the vehicles of great firms blocked one-third of the street in loading up at all hours of the day, the trouble being especially great in the evening.

There was a simple way of dealing with this which he had often advised clients to adopt, and that was to make docks and dock-ways where carts could be backed in. That was not, of course, always possible, but where it could be done it immensely relieved the pressure in the street in front of business premises. He found that if he left a cab for a few minutes in front of his own office a policeman very soon ordered the cabman away, and it hardly seemed right that large firms should be allowed to use the streets, for loading up purposes, in order to save the expense of providing proper accommodation upon their own premises.

With regard to the question of tramways, he did not altogether share Mr. Woodward's views, but he thought the rights of tramways should be limited as suggested by the Commissioners, and that they should only be allowed in suitable places. He did not see why tramways should not be extended, and largely extended, up to the very edge of inner London, and then, when the traffic was brought towards the centre, it could be dealt with by tube railways or motor omnibuses or by similar means. The route to Shepherd's Bush was, to his

thinking, an ideal one. It seemed to him that, in this way, the tramway system might be usefully extended round London, but not in the centre itself.

He was fully convinced that many of the complaints against tramways arose from their being brought up to dead ends. If they were continuous (even if only a single line went round) and there were no dead ends and stopping places, half the trouble would be done away with.

Of course in places like High Street, Brentford, one must expect to find trouble, for that was an entirely unsuitable street, unless it were widened, for a double line of trams to run through.

Some of the Commissioners' suggestions were, to his mind, impracticable, such as that of a tramway from Knightsbridge to Aldgate along the Strand, Fleet Street, Cheapside, and Leadenhall Street, and again in the case of Norton-Folgate at the end of Bishopsgate Street Without, which was certainly not broad enough for tram lines until it had been widened, which would be an expensive process.

Mr. P. E. PILDITCH (Fellow) said he was quite sure the Meeting would agree that The Institution was very much indebted to Mr. Woodward for his Paper, and that the expressions of commendation by Mr. Stenning and Mr. Chatfeild Clarke had indeed been well deserved.

The subject was, of course, a very complex one, and the Report of the Commission was so wide and exhaustive that the preparation of a Paper, which, even to some extent, summarised its conclusions was a task well worthy of the heartiest recognition.

Like Mr. Chatfeild Clarke, he could not help thinking of the Meeting 20 years ago, when Mr. Woodward read his former Paper. Much had changed since then—except perhaps Mr. Woodward himself, for if he had not admitted that it was 20 years ago, it would have been hard to believe it. But even Mr. Woodward had changed his views of this great question. He thought anyone reading his earlier Paper would possibly agree that the ratepayers would have been quite justified if their quills had come up on end, for some of the suggestions were of a very expensive character. To-night Mr. Woodward had told a very different tale and now felt disposed to agree with the man who said, "Let posterity "look after itself—it never did anything for me, and I "do not intend to do anything for it."

The big schemes and ideals which the Commissioners put forward had not been dealt with in the present Paper, but, as he thought quite wisely, the author had confined himself to smaller points which might, perhaps, have more chance of commanding immediate attention.

He quite agreed with Mr. Stenning in what he said about a Main Traffic Board. He understood that it was rumoured that an even more august body than the London County Council—the Government itself—did not mean to push forward the question of a Traffic Board. He believed it had even been suggested that the former body desired to act in that capacity itself. He did not wish to attack that body, or to underrate its business capacity, but he ventured to express the opinion that if this extra labour were put on the London County Council, who had already so many and such various functions to perform, besides having so many members engaged in the House, it would be a mistake, and he failed to see how the County Council could find the

time to carry out the work. Again, it must not be forgotten that they would be in the position of adjudicating on a large portion of their own work, which he thought was a very undesirable arrangement.

He thought it would be well to consider for a moment, if time permitted, what the Commission set out to do. He took it that it had in view two objects: first, the improvement of passenger, carriage, and other traffic about the streets of Central London, and then the facilitating of travel into and out of London, with a view to solving the problem of the housing of the working classes.

With regard to traffic communication from the centres to the suburbs, he was bound to say that he agreed rather with Mr. Chatfeild Clarke on the question of tramways than with the author of the Paper. He was satisfied in his own mind that there must be tramways in large arterial thoroughfares, to go through London from one end to the other, and without any great termini which caused blocks, such as at present existed on the other side of Westminster Bridge.

He was quite with the author in thinking that two-thirds of the lines of tramways referred to in the suggestions of the Commissioners, or those for the central districts, ought not to be undertaken until the motor omnibus had shown what it could do. He feared that motor omnibuses would never be cheap enough for long distances. He thought that vehicles which, like the tramcars, had not to carry their own motive power, and could run on even surfaces, must be able to take passengers for long distances at a cheaper rate than those which carried their own motive power, and which wore themselves out by their rapid progress over all sorts of pavings.

While, therefore, he thought the motor omnibus should be given its chance, and probably would answer well in the central parts of London, he agreed with Mr. Chatfeild Clarke that there was a great field still open for tramways in getting people from the centres to the suburbs.

The power of doing this would be much facilitated if the two great projected thoroughfares from East to West and North to South were carried out, but as these were improvements of the class which, unlike railways and tramways, brought no return, and the ratepayer was already heavily burdened, he feared they would not be carried out just yet, desirable as the project was.

There were several other points which he should have liked to deal with; but as time was going on there was only one to which he would refer, and that was of a semi-personal nature. Mr. Woodward, in his Paper, had denounced not only the London County Council —which was no doubt by this time used to denunciation—but he had also blamed many of the local authorities for digging up the roads and leaving them open, and taking months where they should take weeks, and having men who did not take their work as seriously as they should, and committing various other sins. Granting that local authorities and officials might possibly consist largely of persons of weak minds, he must take exception to to Mr. Woodward's special reference to the Westminster City Council, of which, he (Mr. Pilditch) happened to be a humble member. He did not know the exact case referred to; it appeared to be some terrible thing done in the neighbourhood of Eccleston Square, where an unfortunate person was summoned for having placed upon the footway two posts to hold up an awning. As a matter of fact, that

person would not have been summoned had he only given notice to the authorities, and paid a trifling registration fee. He unhappily neglected that formality, necessary to preserve some control over the footways, hence the summons.

He would conclude by again expressing his personal thanks to Mr. Woodward for the Paper, which he had enjoyed almost as much—in fact, he might say quite as much—as that which Mr. Woodward read on the subject 20 years ago. He only hoped that 20 years hence he would prepare and read an even better one.

Sir GEORGE BARTLEY, K.C.B. (Visitor), said that as his name had been referred to as a Member of the Royal Commission, he should like, with the permissson of the Meeting, to say a few words on the Paper.

The subject of London traffic was a very difficult one indeed, and as had been stated, he had not felt able to agree with the Report. It seemed to him that London was developing its traffic to such an enormous extent that he entirely differed from the statement that the real remedy was to be found in small improvements in different parts. He agreed with the suggestions of the Report with regard to slight alterations in police regulations and such things. Of course, though it went without saying that, on the whole, the police managed the traffic admirably, yet many things could still be done to improve the traffic. The traffic of London in 1891 was estimated to amount to about 270 million passengers in the year, and in 1904—13 years later—that 270 millions had increased to 1,164 millions, that was to say, between four and five times as many as 13 years before. This showed what an

enormous development had taken place, and if it were likely, as he thought might well be the case, that this was going on increasing, possibly in a still larger ratio in the future, it was clear that no amount of small alterations or improvements would meet the problem in a way worthy of London. If it were remembered that locomotion in London, though great and growing, was only one-half that of New York, and not nearly so great as in Berlin, it seemed a pity that London should be behindhand in providing for it.

After having attended the meetings of the Commission for two years, it seemed to him that the real solution of the problem was to boldly face the great question of wider roads, north to south and east to west. It was true that it would be a great and expensive undertaking, but when one came to think of the enormous loss to Londoners in trade and commerce, arising from want of rapid transmission both of passengers and goods through the streets, he felt that all present would agree with him that, if it were to be done, it was a reasonable thing that it should be done properly and thoroughly. He believed that one of the first things to do was to make the two proposed great thoroughfares. That running east and west was perhaps the more important.

There were many suggestions for regulating the heavy traffic, but unless the roads were broad enough, it was not possible to put more traffic on them, but if these two great thoroughfares were made, the police could easily deal with the heavy traffic. Under these new thoroughfares subways or tramways could be laid, which would connect practically all the railways within London and take passengers from all round Greater London direct to the City.

With regard to tramways, though he strongly objected to the proposals for some of those suggested, he believed thoroughly in tramways where the road was wide enough, but he would never allow them where there was not room for two lines of vehicles on either side. In Berlin and New York they were all very well, but to argue that we could relieve the present congestion by putting tramways in our narrow streets was absurd, but some people seemed to be absolutely mad on this particular question. He remembered that one witness before the Commission actually wished to lay a tramway through Lombard Street.

With regard to the various suggestions as to vans stopping and causing obstruction to the traffic, some theorists forgot, he feared, that the streets of London were for the use of the trade of London, and to say that vans should not load would be seriously to hamper many important businesses. As Sir Joseph Dimsdale said, without all this pressure of business London would cease to exist. The streets must be adapted to the business of the great city.

The first thing to consider was what London wanted and how to meet that want, and it was not wise to say that we would not have this or the other thing, for we might thus run a risk of damaging the trade on which the prosperity of a great city depended. He believed it had even been suggested that no one should be allowed to stop his own conveyance even in front of his own door for fear of impeding the traffic; but after all the streets were for the purpose of business, which must be carried on, and they must be made to suit the business they have to contain.

He, for one, felt the great importance of creating

a Traffic Board, which was, he believed, the first step in the solution of the problem.

As to the London County Council, of which he desired to speak with great respect, he thought it would be a most disastrous thing if that body should be the Traffic Board, thus being judge and jury in their own case. They covered a very important area of London, but only, after all, a comparatively small part of Greater London, and the problem concerned outer London more and more every year. People came from greater and greater distances, and he believed it was most important that the suggested Traffic Board should be independently appointed by the Government and free from politics or party. Such a Board should be free to frame a scheme and have some general idea of their own, considering the needs of London as a whole. They should also, when called upon from time to time, consider matters brought before Parliament, and report on them as affecting the traffic of London as a whole.

The matter would have to be debated and would take many years to complete, though in one sense it never can be complete, as progress must always go on. Sir Christopher Wren drew out a plan which, if the authorities had only had the courage to face it, would have made London very different from what it was to-day. He trusted that Members of The Institution, with their knowledge and experience, would face the matter boldly, for unless something were done to prevent the congestion growing still worse, the progress of the centre of our Empire must be retarded and injured. He thought, whatever the cost, it would be a well expended outlay to do the work thoroughly and to frame such a scheme as, once and for all, would have in it

the means of meeting the wants of London, certainly for generations to come.

The discussion having, on the motion of Professor Henry Robinson, been adjourned to the Meeting of Monday, March 26th, the vote of thanks was put to the Meeting and carried unanimously,

AT

# THE ORDINARY GENERAL MEETING,

*Held on Monday, March 26th,* 1906.

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GEORGE LANGRIDGE (Vice-President) in the Chair.

The adjourned discussion on the Paper by WM. WOODWARD (Fellow) read at the Ordinary General Meeting on March 12th, 1906, entitled, "The Means of "Locomotion and Transport in London," was resumed by

Mr. J. H. SABIN (Professional Associate of Council), who said that, in the unavoidable absence of Professor Robinson, the duty had fallen upon him to reopen the discussion.

It was hardly necessary for him to congratulate Mr. Woodward on his courage, for that was a virtue which he possessed in a very eminent degree; but he was not quite sure he had not almost overstepped the mark in again attacking his two pet-aversions, the London County Council and the British workman. He must not forget that it was the London County Council to whom he was indebted for the carrying out of his splendid vision of a great road from Holborn to the Strand, and he might venture to suggest that it was the much-abused British workman who had converted into solid realities the airy creations of Mr. Woodward's

brain; so that, after all, he was indebted to the County Council and the British workman for a considerable amount of the pleasure which he experienced in the fulfilment of his designs.

He would go a step further, and suggest that Mr. Woodward had shown even greater courage in placing himself under the wing of a director of a company, which had a large share of London traffic, but never adopted a new idea until some one else had shown how to do it, and never broke into a fresh route until a rival company had already tried it. He was, therefore, hardly inclined to take that gentleman's advice with regard to the undesirability of enlarging the routes of tramways.

But, apart from those questions, he thought the very stubborn fact must be faced, that it was practically impossible to be without obstruction of some kind or another in the streets. We could not expect to entirely abolish it, any more than to abolish the delays which occurred in the Courts of Law. All we could do was to mitigate and modify it to the best of our ability.

Obstruction arose, in the case of vehicular traffic especially, either wilfully and unnecessarily or from necessity. It was quite clear there was a great deal of what might be called wilful obstruction, and Mr. Woodward had hit very hard those persons who were responsible for it. He had named the Borough Councils and the different companies who had a sort of free hand to deal as they pleased with the London streets, and he had alluded also to that very immovable person, the driver of a London cart or waggon.

It was amazing how particular a London carman was about his horse's head and bridle—he would hardly let a policeman look at it, but he would draw up at the side of the road, where there was very

little room to pass, and stay there until it pleased him to move on. The other morning he had occasion to come down Albany Street, and he noticed that the authorities had apparently arranged that a piece of road should be taken up, leaving exactly room enough for a vehicle to pass against a drinking trough for horses. Every driver who came along appeared to think his horses wanted watering, and to choose that particular place to stop at. That was within 100 yards of the Albany Street Police Station, and all that was wanted was an order from the sergeant or inspector in charge to see that the road was clear, at any rate during the busy hours.

The last man he would suggest to have anything to do with London traffic was the policeman, but he would welcome the appointment of managers. Whoever saw a policeman in a hurry?

What was wanted was a band of alert, sharp men who would see where the obstruction of the traffic arose, and would solve the difficulty without much ado. Then, without doubt, there should be some method by which wilful obstruction by loca bodies and companies should be put an end to.

He did not know how to describe the obstruction that occurred at the Oxford Street end of Tottenham Court Road and the Euston Road end of Hampstead Road. He did think a little order had been introduced there until he found, at 20 minutes to 10 the other morning, at the Euston Road corner, two brewers' drays, one distillers' wagon, and two aerated-water carts, all delivering goods at the respective public-houses at each corner, and, to add to the confusion, a dust cart removing refuse.

That was in progressive St. Pancras, but at the corner of Oxford Street in Holborn he found two coal

carts, one brewers' dray, one pig-wash wagon, and, as if to make things perfectly just and even, a dust wagon which was taking refuse in Charing Cross Road. That, at 10 o'clock in the morning, was nothing less than a scandal. There should be some alteration in the hours, so that goods might be delivered and dust collected not later, certainly, than 9 o'clock, even if not earlier, and not until after, say, 6 o'clock in the evening or later.

The new corps of traffic control should, he thought, be entirely independent of the police. The police in the City certainly managed matters better than in other parts of the Metropolis; but that was, he apprehended, because they were under the control of persons who were themselves most inconvenienced by delays in the traffic. The Police Commissioners, on the other hand, were one of those immovable and irresponsible bodies who would hear all one had to say and do nothing, because there was nobody to govern them or turn them out of office. The new traffic managers should be under the control of a popularly elected body, which would be answerable for seeing that they did their duty.

There were of course some things which could not be altered, such as the obstruction caused by narrow streets and crossing traffic, which must be endured as well as possible and reduced to a minimum. In his grand scheme of 20 years ago, Mr. Woodward suggested several methods by which that could be, at any rate partly, altered, but there was another way, he thought, to relieve the difficulty and alleviate the congestion to some extent. There were few principal streets that had not other streets parallel with them. Tottenham Court Road, for instance, had Gower Street, and Oxford Street and other streets had streets parallel

with them, but neither the slow nor the quick traffic cared to take those side streets, unless, perhaps, an occasional stray hansom did so. The traffic managers ought to have the power to turn traffic into such side streets, and should adopt the plan already in force with regard to the approach to Liverpool Street Station. Vehicles should go in by one route and come out by another. There would be very little loss of time by having to pass from one route to another, if one wanted to catch the vehicle on its round.

A reference to the map of London would show, however, that though there were many of these side streets, they were in some cases blocked and narrowed at the ends. It would cost comparatively little to remove the houses, which were usually of small value, at the end of those blocked-in parallel streets, and so to make a clear road through. For instance, Whitfield Street, running parallel with the Tottenham Court Road, was blocked at the north end by a few houses which might be removed, and there were scores of similar cases in other parts.

With regard to the question of trams, he was prepared to join issue with Mr. Woodward altogether. He would not venture to disagree with so redoubtable a champion if it were not that he found himself in good company, which included members of the Advisory Board of the Royal Commission. His complaint was not that there were too many trams or tramway routes, but that there were not half enough. Mr. Woodward said there was a grand total of 350 miles of tramways in London. He was not sure whether that was single or double lines, but supposing it were 350 miles of double lines, that amounted to about one mile of tram to a square mile of area, which surely could not be said to be an excessive proportion.

The chief difficulty with regard to tramlines arose from the number of dead ends, as had been pointed out by the Royal Commission, who suggested that the dead ends should be joined together at the centre: but another method would be the formation of circular routes. For instance, a tramway down the Tottenham Court Road ought to be turned off eastward, and, without a dead stop, run round Gower Street and George Street, and so on. The short distance between the two streets would cause very little inconvenience. His rule would be that a tramcar should never stop dead on its route, except at its outer suburban end. That would considerably relieve the congestion that existed, at Moorgate Street for instance, at the end of Hampstead Road, and at other places. In the same way the Embankment might be utilised, still leaving plenty of room for the motor car traffic. It always seemed to him a lamentable thing that such a magnificent thoroughfare as the Thames Embankment should be almost useless for the relief of London traffic.

The other day he spent a few hours in Manchester, where he found a system of tramway traffic which made his mouth water. If only that system of tramways could be transferred to London, Londoners would indeed be happy. There was never any obstruction—the cars followed each other with rapidity, and when they got into the centre of the city, opposite the Town Hall, they simply divided off right and left. There was no stopping—they were constantly moving, although occasionally there were six cars, one after the other, in one thoroughfare. When they came to the cross roads they dispersed like magic without interfering with anybody, and one of the purposes they seemed to achieve was to keep the other traffic in its proper place.

Mr. E. W. HUDSON (Fellow) said he could hardly sympathise with the last speaker's condemnation of the Metropolitan Police. He must confess to a great admiration of the way in which they now managed the streets, and he did not think that any dragooning of our traffic would be submitted to by Londoners. The police had, he thought, power only to regulate the stopping places of metropolitan stage carriages, and he agreed it would be desirable that they should also arrange the routes that certain traffic should take.

The Paper rather invited comparison with Mr. Woodward's former very elaborate scheme, for the author now suggested far less drastic measures for ameliorating the condition of the traffic.

After reviewing the Report of the Royal Commission, Mr. Woodward expressed his approbation of the work, but still recommended a middle course. He had nothing to say against that, but he was confident, from long consideration of the matter, and as an old municipal officer who had always felt interested in the subject, that nothing less than the re-alignment of the streets of London would meet the case in a permanent manner. If one looked abroad to continental capitals, and considered the plans adopted in cities with not a tithe of the area of the Metropolis, it would be found that they were nearly all furnished with circular routes, radial streets, or magnificent boulevards. It was well to think imperially in such matters. He did not suggest that anything like a Disraelian ideal would be possible for many years to come; but any great scheme now laid down was not a matter which concerned the present generation only. As in Paris, for instance, the work must be spread over at least two generations, and then it would be possible, after that time, to have a

city of which our descendants could be proud. He thought in a great Empire centre like our own we should act on the principle of *noblesse oblige*. If our ancestors had thought imperially and had, after the Great Fire, followed the plan of either Wren or Evelyn, we should not now have been in our present predicament.

Unless we decided that, by subterranean traffic, we could provide for the requirements of to-day, it seemed to him that nothing else than pulling down a vast amount of property and making circular routes round London, such as were to be seen abroad, would ever meet the case. Every year's delay must of course increase the expense; but by spreading the repayment, as he suggested, over a number of years, the cost would be shared by our descendants, who would reap the benefit.

He fancied that Mr. Woodward was rather inclined to further restrict the user of our streets by vehicles. He had already suggested how that might be dealt with in the case of stage carriages, and that was, he thought, as far as we could go in that respect, and he was glad to find Sir George Bartley's views coinciding with his. The needs of the carriage transport of London, on which our commerce so much depended, must be considered. A great deal had been said about the nature of the vehicles that should be employed, *i.e.* motor vehicles *versus* horse vehicles. The time was coming, he believed, when horse omnibuses would be superseded by motors, whereby space would be gained, and a certain amount of obstruction would be avoided. It was the custom to abuse the old horse tramcars. He had to do with their introduction into London some 35 years ago, and he thought they had served the generation well, and contributed towards the cost of road repair, though their days were no doubt now numbered.

To avoid the constant delays caused by the trenching muddle, he would certainly advocate compulsory overtime and night work.

He regarded the extension of tramways by municipal authorities as not only undesirable, but as also too speculative. Their effect on property was, of course, detrimental, for when a tramway came in a good residential neighbourhood another class of tenant soon came into occupation, who, socially, depreciated the neighbourhood, though perhaps, by means of sub-letting and in other ways, the actual rentals were kept up for a time. As tramways further extended and the inhabitants moved out, there would be considerable depreciation along the present routes, and he should therefore like to see municipal enterprise at least confined to the outer suburbs until it was seen what could be done by the motor omnibus, which was certain to be much improved in the near future.

As to tramways on the Embankment, he, for one, should be very sorry to see them. Budapesth, he believed, absolutely prohibited any driving at all on those fine quays on the banks of the Danube, which were practically *al fresco* places of enjoyment. He thought it would be an unfortunate thing if the Embankment were treated as proposed.

As to the tramlines crossing the bridges, he did not see the same objection. In Paris the cars passed over the bridges without detriment to the city, but he hoped we should be able to devise some more elegant vehicle than the Paris car, which, to his thinking, was very ugly.

As to our own Embankment, he most earnestly hoped that every one would do what was possible to prevent any interference with that magnificient curve of river-wall from Waterloo Bridge to Blackfriars. It would be abso-

lutely spoilt by cutting through the Temple Gardens for putting, as suggested, 600 feet above Blackfriars Bridge, a bridge for which he did not think there was any necessity. In the *Professional Notes*, some little time ago, he suggested that the dreadful structure of Charing Cross Railway Bridge might be screened by a bridge on the west side carrying all the traffic from the west across the river.* If Blackfriars Bridge were widened on the east that would relieve traffic, and Waterloo Bridge must also be widened. It was now only 44 feet wide, but it should be 70 feet. If that were done, he did not think there would be any necessity for another bridge across the Thames, at any rate for the next 80 or 100 years.

To assist the traffic crossing the Strand at Wellington Street was a very difficult matter, but he thought it could be done by widening Waterloo Bridge on the west side and making an inclined road passing under the Strand, and so through Covent Garden by a new route, terminating, say, at the top of Shaftesbury Avenue in Bloomsbury, or at some other convenient point.

To deal with the traffic from Blackfriars Bridge across Ludgate Circus was another difficult matter. The plan suggested of starting an incline from the centre of the bridge and crossing the Circus on columns could not fail to be very ugly, but certainly not so bad as in the former case, for one hideous bridge already blocked the view of St. Paul's, and a duplication could not add much to the ugliness. He thought a shallow tramway at least possible without a high level road here.

Overhead lines were undesirable, as any one who had seen them must feel. He believed that in New York they were about to be abolished.

* *Professional Notes*, vol. xciii., p. 286, *et seq.*

As to refuges, Mr. Woodward thought some of them might be dispensed with, but if we must have wider roads and faster vehicles they would have to be increased rather than diminished in number.

Fixed stopping places for motor 'buses might in some cases be desirable, but it must be remembered that the stoppage of all vehicles at one point might cause even more delay and obstruction than if they set down or took up passengers when required. He thought the suggestion referred to was a good one, that there might be a circular railway of about 8 miles radius round London. Mr. R. W. Perks, M.P., suggested a boulevard of 12 miles radius, or 74 miles round, but he thought that was rather *in nubibus* at present. It might be desirable to take time by the forelock and prepare for it, but in the meantime the actual central traffic must be dealt with. The method proposed in the Royal Commission's Report would not, he thought, effect all that was expected of it, and he should much prefer to see a circuit avenue such as he had already suggested in the *Notes*, instead of the avenues A and B.

As to finance, the coal and wine dues would produce, he believed, about £500,000 a year. In Germany pleasure motor vehicles were taxed and produced £175,000 a year, and to such improvements the municipality and the Imperial Government should contribute. He thought the greatest city in the world was able to find the money that it ought to find it, and that ultimately it must find it.

Mr. WALTER BEER (Visitor) said that, though he had not been able to go very carefully through the Paper, he thought he followed the chief points made by the author. He gathered that he disapproved of any-

thing like drastic measures, and rather pinned his faith to alterations in police regulations or minor improvements of various kinds. There he must join issue with him, for he thought that, if any real improvement was to be effected in the condition of London traffic, it could only be by some bold and comprehensive scheme.

The problem could, he took it, be divided under two heads, namely, the conveyance of passengers and the increase of facilities for vehicular traffic. He thought the conveyance of passengers was not at the present time a pressing problem. There were about to come into operation a large number of new tube railways, improvements in omnibus traffic were projected, a large number of motor omnibuses were now being put on the streets, and he thought that, before expressly setting out to provide any further facilities in that direction, opportunity should be given to show what those means of transit would effect.

He therefore suggested that the real problem to be considered now was that of vehicular traffic, as, he thought, was recognised by the Royal Commission. It was true the Commission devoted a large amount of attention to tramways; but the major difficulty they felt concerned the vehicular traffic.

The Commission had produced a most valuable Report, and he was the more readily inclined to admit its value because he had the honour of giving evidence, and also of assisting the Advisory Board in the preparation of the elaborate tables and the maps which they had produced. He was quite sure that these would, for many years to come, prove indispensable to everyone who wanted to learn what London traffic meant.

But he must own to being somewhat disappointed with the Report of the Commission taken as a whole,

for, although that Report must continue to be most valuable as a book of reference, still the Majority Report, at any rate, did not contain any clear expression of opinion on the real difficulty to be faced. It did suggest that new arterial thoroughfares through London were needed; but the suggestion was made in a very tentative way, and it was not until one had passed over the Majority Report and came to Sir George Bartley's independent report, that he could find any clear statement on that most important point.

In conjunction with Mr. Charles Meik, he had spent a considerable amount of time and made, to him, a very interesting study of the condition of London vehicular traffic, and had found that the only way in which the problem could really be solved was by the construction of two arterial roads right through London, one from north to south and another from east to west. Although new main thoroughfares had previously been proposed from time to time, it had not before, he believed, been suggested that they should start in the open country and go right through the centre of London out to the open country on the other side. That, he thought, was essential to success. If those roads did not extend from open country to open country they would not have a sufficient collecting area to attract to themselves such a body of traffic as would make their construction worth while.

Moreover, it would not otherwise be financially possibly to build them, for the principle of recoupment could not be successfully applied in the centre alone, but if it were carried out along the whole route there would not, he believed, be any great loss. He therefore laid it down as essential that there should be new main avenues passing through the centre, from open country

to open country. If those roads were to be of any real utility, he thought they should be carried at a high level through the most crowded districts, for, if that were not done, traffic would be held up at every cross street. It might well be worth while for a driver to go a little out of his way in order to meet some main thoroughfare along which he could go rapidly, but if he was then to be constantly held up it might not be worth the trouble.

Then those thoroughfares, being carried right through, must be provided with railways and tramways. He did not suggest railways along the surface, but he would put them below the road, or overhead, or adopt some mode so as not to interfere with the traffic. The construction of such a road would necessarily displace a large number of people whom it would be impossible to rehouse in the central districts, but if the road were carried right through to the outskirts, it would be quite possible to rehouse them cheaply, and they would contribute traffic to the railways, which would be a source of profit. Having driven the thoroughfare through at enormous cost, there would be formed a valuable route, and the amount earned by the railways and tramways would go to assist recoupment, and, in the end, the two sources of profit would pay for the whole improvement.

In dealing with the question of recoupment, Mr. Meik and he had, with the assistance of Mr. Low, a competent valuer, taken London in sections, going over the whole of the ground and actually valuing up the cost, and the possible value for resale, of surplus lands along certain avenues which they laid out. They found it necessary to acquire, in the first instance, three times the width of land actually needed for the road, in order to bring the recoupment out somewhere near right. When passing through the City they took no

more land than was absolutely necessary, and, at certain points, found it desirable to take perhaps a little more than three times the width; but, working on that average, it was found that the recoupment worked out very closely indeed.

He mentioned that particular scheme simply because, while it was easy to theorise on the possibility of constructing great main avenues of that kind, opinions, to have any value at all, must be backed up by some definite concrete scheme. For details of this scheme he would refer to his evidence before the Royal Commission, and to the Paper which he had read jointly with Mr. Meik before the Society of Engineers.

In conclusion, he would repeat that he was convinced that there were no means of really relieving London traffic except by the construction of new arterial thoroughfares, not necessarily along any particular route, but right through London, and he was sure that if such thoroughfares were properly designed, they would pay their way, and would largely increase the commerce and conduce to the material welfare of the inhabitants of London.

Mr. LYNDEN MACASSEY (Visitor) said that, as Secretary to the Royal Commission on London Traffic, it had given him very great pleasure to follow the discussion on Mr. Woodward's most valuable Paper.

It seemed to him that the questions underlying the improvement of locomotion and transit in London were, first, what could and should be done in the immediate present, and secondly, what could, with less detriment to more pressing necessities, be for the moment left over. He felt convinced that, before recommending very large schemes involving the expenditure of great sums of money, it was well to be satisfied that the existing

streets and means of transport were being used to their full capacity.

He would put forward a few suggestions to indicate that this was not the case. First, as to streets; the boundaries of different parishes or boroughs passed in some cases down the centres of the streets, the local Council in one district refusing to allow, for example, a shelter to be put at a certain spot, while the Council on the other side permitted it to be put there. So, in some streets, a shelter would be found cut in two, one half completed and the other missing. In other parts, one half of the street was allowed by the Council to be broken up at one time, and the other half, under another Council, at a different time. Then, in the newer parts, one found a main street allowed by the local authority to be formed running east and west, while, as a result of the local feeling between competitive owners, the main streets in the immediate neighbourhood, under another authority, were planned to run north and south, absolutely at right angles, rendering it impossible at any future time to amalgamate those streets to form arterial routes.

In the case of tramways, the same state of things existed. There were 13 or 14 places round the outskirts of London where the passengers, under present conditions, would be forced to change cars on main routes. In the case of railways—Bills were at present passed by Parliament without reference to any comprehensive plan. For instance, a tube line had been constructed between Kings' Cross and Earl's Court, called the Great Northern, Piccadilly and Brompton Railway. That had been evolved by financiers out of three different schemes. They had taken out of each scheme what they wanted, and rejected those parts which did not fit in. All these questions of

London traffic were decided by tribunals of the House, which did extraordinarily well with the evidence before them, but necessarily without continuity of policy, and under conditions so inflexible as not to admit of any improvement in the original measure as introduced into the House. A Bill was considered, and, if an amendment were required, the Bill must virtually either pass as introduced, or be brought forward again in amended form next Session.

That suggested to him that, in the case of streets, tramways, and railways, the first thing to do was to secure co-ordination and correlation of the existing means of transport. The study of locomotion was a special subject; public convenience conflicted so often with the vested interests of existing authorities, that the matter must be taken in hand by some absolutely impartial and comprehensive tribunal.

He would refer briefly, if he might do so, to the countries about which he knew most. In France, co-ordination had been secured by central governmental control. In the entire absence of private enterprise, from the earliest days the construction of roads, canals, and railways had always been left to the Government, and when the first national road was constructed a complete scheme was adopted for the whole of France. Railways were also constructed, from 1845, as part of a complete scheme, and on this same plan they were to-day being built. Napoleon, in 1793, for military reasons, laid out the roads in Paris on comprehensive plans, and the streets are still formed on these lines.

That was all very well in a continental country where private enterprise was absent; but in Anglo-Saxon countries like America or England, where private enterprise was the order of the day, the conditions of

control must be different. In the case of the United States, the difficulty was met by the establishment of an *ad hoc* tribunal. The type of authority which was now being adopted as the most efficient was that known as the Advisory Tribunal.

He could, had time permitted, have given instances of tribunals for dealing with tramways and railways and other matters on the Continent of Europe and in the States, which had voluntarily had their powers cut down from compulsory to advisory powers. The idea was that the recommendations of an Advisory Tribunal rested on their merits, and, if not supported by the weight of the tribunal, ceased to have force; but, granted the tribunal consisted of competent persons, its recommendations soon had the force of law, without the possible objections of enforceable powers.

In New York, a special Transit Commission was appointed, and had four-fold powers—first of all administrative power for laying out schemes for underground and elevated railways in New York, and for constructing or regulating the carrying out of those schemes. It had the sole legislative power for authorising the construction of such railways in Greater New York. It had supervisory and advisory powers, reporting on all defects of existing means of locomotion, and where defects existed, recommending their remedy. It was also called upon to make annual reports suggesting what should be done in the interests of locomotion in Greater New York. There was a similar body in Boston, and other cities in the States were following the same plan.

That seemed to him the first thing to be done in London. Before attempting to construct new streets or arterial roads, or new railways or tramways, a tribunal of that sort should ascertain whether the existing means

of locomotion were being used to their full capacity. Until that was done, it was not possible to decide what was necessary in the way of permanent improvements. The schemes referred to by the Royal Commission laid down the lines for the Board's investigation.

What he suggested was on the lines of the Traffic Commissions' Report, that a tribunal of that kind should be established with advisory powers, and that every Bill affecting locomotion in Greater London should, as soon as it was introduced into Parliament, be referred to that Board for report. The Board should make a report pointing out to what extent the Bill failed to meet the requirements of London generally, and it should then be competent for Parliament to order, if it thought fit, the amendment of any particular Bill in such a way as to give effect to the recommendations of the tribunal.

The tribunal should also have supervisory powers, and be empowered to investigate existing defects in the means of locomotion, and to draw attention very sharply to defaulting authorities, who authorised, for example, the erection of lamp-post standards and shelters and such things in the streets. It should also have the power of exposing the action of local authorities in allowing, as he had indicated, streets to be constructed in London on such a haphazard plan as to be incapable of inclusion in any scheme of arterial communication.

It should also be empowered to recommend methods for the proper regulation of traffic, that certain streets should not be used for heavy vehicles at a certain time of the day, and so on. The police had ample powers at the present moment, if they chose to use them, for dealing with that matter.

The Board should also have power, if requested, to make recommendations to Parliament, and to make

known its views to defaulting authorities. It should again, have not only supervisory powers, but also mediatory powers. A good deal of the difficulty in London was due to the friction which existed between local authorities and tramway and railway companies.

The Board could do immensely valuable work in reconciling those interests. In 1898, in Massachussetts, a special Act of the Legislature was passed providing that the State Board of Railroad Commissioners there should decide all disputes between tramways and railways and local authorities, as to the construction of tramways or railways in any such authority's district. The evidence taken out there by the Royal Commission (which would shortly be published) showed, in a most striking manner, what had been the advantage of the exercise of those mediatory powers.

He would suggest therefore that the first thing to be done was the establishment of such a tribunal to see what could be done with London as it stood to-day.

He did not for a moment doubt that many new streets, tramways and railways are, as they indeed are, sadly wanted, but what he was afraid of was that the construction of streets at the present moment might be commenced in localities where existing evidence was not sufficient to indicate the precise public requirements.

The sooner the better therefore, should the tribunal be appointed, for every year would add to the difficulty of improving London.

Mr. HARRY G. ASSITER (Fellow) said he felt he should have the majority of those present with him in agreeing with Mr. Woodward's conclusions with regard to the conservatism of London and Londoners. It had been shown, time after time, how difficult it was to move

Londoners from their old ways and get them to take up any new methods.

He also agreed with him as to the necessity for some immediate relief rather than waiting for the great advantages which would result from the construction of the two proposed grand avenues through London, which could not be brought into being for many years to come. Any present relief must of course be on the lines of taking London as it was. When the new thoroughfares were constructed some assistance should be given by the State. London was already overburdened with rates, and he was quite sure that, without help, it would be impossible to construct thoroughfares at such an enormous cost as these must involve. He thought Sir George Bartley had struck the right note when he said that the streets of London must be regarded as being for the purposes of the citizens of London for carrying on their trade, and that the streets must be made to fit that trade rather than the traffic to fit the streets.

That was a very important point. It was impossible to restrict traffic in any way, if it were likely to inconvenience the citizens, for such an attempt must necessarily defeat its own ends; but much might be done by a stricter enforcement of the rules of the road, compelling the slow traffic to take the side of the road, as it was now supposed to do.

The unreasonable blocking of the streets by the drawing up of vehicles at awkward places ought to be stopped. More stringent regulations were wanted in the case of brewers and others delivering goods, and the scavenging of roads at all times of the day. The continual breaking up of the roads had been referred to, and he need say no more as to the inconvenience thus

caused. He could not altogether agree with Mr. Woodward as to tramways. He thought tramways were very beneficial, and he considered the modern tramway worked by electricity was the most suitable means of locomotion on established routes with good traffic and suitable roads; and with increased speed and defined stopping places it might be hoped that there would be considerably less obstruction from tramcars in the future than in the past. Of course the greatest obstruction arose at the dead ends, and if these could be done away with and through-routes established, there need not be much serious obstruction from tramways. He did not hold that surface tramways should come into the central parts, already sufficiently burdened with traffic. Whether subways should be constructed was a matter for further consideration.

An Outer Circle Railway was mentioned by Mr. Stenning, for which a Bill was in Parliament in the present Session. Some 20 years ago an application was made and an Act obtained for the construction of a similar line, which might then have been easily made. He was afraid that the route suggested, lying as it now did through closely built areas, would involve too prohibitive a cost. That rather led to the reflection that London never did anything until it was absolutely obliged to. Warnings were neglected, and, as Mr. Woodward said, far-seeing men were regarded as revolutionaries and Utopians. Over 200 years ago, shortly after the Great Fire, John Dryden wrote:

> "Methinks already from this chymic flame
> I see a city of more precious mould.
> Rich as the town which gives the Indies name
> With silver pav'd and all divine with gold."
> * * * * *
> "Her widening streets on new foundations trust."

Those "widening streets," if carried out then, would

have been a comparatively simple matter, but would now cost millions. History was again repeating itself, and the legacy of bad and narrow roads, left to us by former generations, we were leaving to posterity in new districts.

The expansion of London was still going on in the same haphazard and accidental fashion, and, in the districts now being built upon, all the old faults were perpetuated that existed in the inner area in times past. Estate development on the borders of London was carried out under isolated schemes, entirely in the interests of the owners and without any regard to public convenience. The only idea seemed to be to crowd as many houses as possible on an estate, and to avoid giving any advantage to adjoining owners or facilities of access to their land. The laying out was, in many cases, under the control of Rural Councils, advised frequently by men not altogether as competent as they might be, and the result was a number of isolated schemes on mean lines with no continuity or comprehensiveness, and the public needs were entirely disregarded.

In the public interest, present and future, it was necessary to get continuity of scheme in the outward expansion of London, with the view of avoiding the difficulties which had arisen in the inner area, and must now be remedied at very serious cost. At the present time there was no cross-country communication, and narrow and crooked country lanes were left unwidened and unstraightened while houses were springing up alongside them. In time those country lanes would develop into main streets, and in 20 or 30 years' time, when they formed the centres of populous districts, must be widened and improved at a very large outlay of public money.

The remedies he would suggest were—

(1) The establishment of some central authority such as had been proposed—which should not be the London County Council—to regulate, among other things, the development of the country around London. He thought that authority should control the whole of the county of Middlesex and parts of Surrey, Kent, and Essex within, say, 20 miles of Charing Cross, and should work with the view to secure sufficient main roads by improving country roads and lanes where necessary, and also, where necessary, constructing new main roads;

(2) To secure comprehensiveness in schemes of laying out the land around London, so that public interests might be considered and future alterations rendered unnecessary; and

(3) (And this was a point which he thought had been lost sight of) the provision of adequate cross-country communication.

Outside London, the existing main roads ran in radial lines, but 10 or 12 miles out there were no cross roads, and one had often to undertake a journey of six or seven miles to get a short distance across country. Good cross-country roads could be secured, now that the country was open, at a reasonable cost. In 20 years' time, what was now country fields would become thickly-built masses of streets and houses, and then any improvements that were necessary would have to be carried out at a very heavy expense indeed.

Mr. GUY M. NICHOLSON (Fellow) said he gathered that Mr. Woodward practically treated the subject under two headings: (1) whether the traffic in London should

be dealt with as suggested by the Traffic Commission, or (2) whether it was possible to get over the difficulty by improving present facilities. He had pointed out the great expense of the Traffic Commission scheme, and that should of course be carefully considered. A warning had recently been given, by the removal of big firms, that rates might become so great a burden that it would be almost impossible to carry on business. If 23 millions were spent on a scheme for new thoroughfares, the interest and the sinking fund would amount to an increase of about one million a year on the rates, and this needed careful consideration before it was undertaken. Some had suggested that State aid should be called in, but if this were done for London why should it not be given for improvements in Liverpool, Manchester, or Birmingham? It would be found that the cost would only be shifted on to the taxes, which no one would contend were now too low.

Public expenditure needed to be very carefully watched, for he feared the rateable value of London would not increase indefinitely, and he did not think it impossible that the rates would reach a point at which the difficulties of existence would put a stop to future development. The difficulty and waste of time involved in travelling about London were very serious matters, and the question now arose whether we had not come to a time when the one remedy would be decentralisation, at all events as far as manufacturers were concerned. There did not seem to be any reason, with the telegraph and telephone, why factories of many descriptions should not be outside London, with their head offices in the City. If this took place, it would remove the chief reason for the large outlay suggested by the Commission.

He supposed the head offices must remain inside, because no other place was linked up like London with Paris, New York, and other centres, but there did not seem to be any reason why the factories should not go out with all their hands, and he should watch with great interest the efforts of the Garden City in the direction of a solution of the problem. It would also help the question of the influx of population from the country to London.

He thought Mr. Woodward's suggestion of directing the traffic to the side streets was very good. There were many streets in London which seemed practically hardly used at all. Of course the omnibuses naturally followed the lines of the busiest streets, but there did not seem any reason why commercial vehicles should do so. He had often been irritated, on taking a cab from the West End to the City, by the cabman driving down busy Fleet Street when he might have gone along the Embankment.

One previous speaker objected strongly to using the Embankment as a tramroad. He looked at it apparently from an æsthetic point, and said that a fine view was already spoilt in London by the Ludgate Hill Viaduct. The æsthetic point of view was one to be considered, but if one sat for a quarter of an hour in a cab waiting to cross a block one got satiated with the view, and it lost its charm. The embankment was constructed for a road and not for the view, and ought to be used to relieve the traffic.

In spite of Mr. Woodward's objections, in most big cities tramways were found necessary, for instance, in Hamburg and New York they were everywhere and very widely used. Of course tramways, like everything else, if put in the wrong place were a disadvantage.

In narrow and crowded streets they no doubt impeded traffic considerably. In Kingston-on-Thames, where there was nothing like the traffic of London, they were found inconvenient owing to the narrowness of the streets, but he did not think, if a tramway were laid up a street as wide as Whitehall, it would be a serious inconvenience to anyone. Some said that tramways depreciated property, but he did not think so. They certainly changed the character of the property. He had seen a tramway laid near a house with grounds which sold for £16,000. It was immediately cut up in small plots and sold again for £30,000, so it did not seem that the value of the property had depreciated from a pecuniary point of view. Of course the owner removed to another neighbourhood, which he was quite at liberty to do.

There seemed to be no real reason why tramways should not approach London as near as possible, and then the through traffic, as far as passengers were concerned, could be largely carried on by tubes. That seemed to him to be the most economical way of dealing with it. Mr. Stenning spoke of the tube railway already working, which he believed only paid 4 per cent. Many people were only too glad to get 4 per cent. on a good security, for they often got less and lost their capital as well. If it were necessary, it would be cheaper to construct tubes out of public money, which could be raised at 3 per cent., than to spend 23 millions on roads. He thought it was open to question whether motor omnibuses would supersede trams. One knew where a tramcar was coming and that it would continue on a definite line, but one did not know where a motor 'bus was coming. He was recently in Piccadilly on a damp day when he saw a couple of motor omnibuses endeavouring

to leave the side of the road, but skidding on the slippery pavement. The front wheels turned, but unfortunately not the back wheels. A hand-barrow at the side of the road was promptly overturned; if it had been a brougham it would have been the same, for the omnibus could not have stopped. Similar mishaps take place frequently in Regent Street leading down to Waterloo Place and elsewhere.

As he had said, with a tramcar one knew the limits of danger, whereas with a motor omnibus it was different. Then, again, motor omnibuses, on roads of ordinary construction, created a very serious amount of dust and mud. Tramlines being steel, the cars did not create anything like the nuisance, and it seemed to him that high-speed motor vehicles, running in increasing numbers every year on the roads into London, would require special thoroughfares laid down for them, which would be just as expensive as making new roads to start with, and far more expensive than the trams.

The author had attacked the London County Council on their expenditure, but, really, the London County Council, if compared, say, with the Imperial Government, did not seem to be so very extravagant. They had, at all events, something to show for their expenditure in the shape of public improvements, which were assets, and in some cases yielded revenue, while recently the Imperial Government had spent 250 millions or so on an enterprise that had really produced no asset that he could see as yet, and had involved very serious losses to the community.

After all, it was not the amount of money expended, but what one got for it. If there were a return, either in health or convenience, or something that paid a

reasonable dividend, the amount of the initial outlay did not matter much.

The British workman had also come under Mr. Woodward's censure. He spoke of the price of brickwork nowadays as compared with its former cost, but other prices had risen too. Ground rents had risen considerably, although ground landlords did no more, but less, for their tenants than in former times. Many people, receiving far bigger incomes than the working man, did not do as hard or as unpleasant work as he did.

Very few in that room would care to do bricklaying at £2 a week for any length of time, and he did not see why the working man should be singled out for blame more than anybody else, for he often carried on his work under undesirable conditions, and was, he believed, a very useful member of the community, although there were bad specimens, as in most callings.

Mr. J. W. PENFOLD (Vice-President) said the discussion had brought to his mind an instance of the growth of our ideas from generation to generation. Two hundred and fifty years ago they had a much shorter way of laying out new streets. In the records of the Goldsmiths' Company there was a minute "that "Mr. Burridge the bricklayer and Mr. Jarman the "carpenter proceed to butt out the new street," which had previously been determined upon, between Aldersgate Street and Redcross Street—it was in 1652 he believed. They were to remove any buildings that were in the way, or any gardens or fences they thought fit, and anybody obstructing was to be brought up before the Court and reprimanded. That new street was "butted out," and in a History of London, published a few years later, it is recorded that "The

"Goldsmiths' Company have recently butted out a "handsome new street leading from Redcross Street "to Aldersgate Street." This "handsome new street" was, at one end, 11 feet 6 inches wide and, at the other end, 15 feet. That was the sort of thing which was considered a "handsome street" in 1652. Our ideas had got beyond that now, as he gathered from the discussion, but we could not make new streets so easily as did our ancestors.

He mentioned that record just to show the difference between the methods of 250 years ago and w hat we had to go through now.*

He was glad to join in thanking Mr. Woodward for his very elaborate and able Paper. He could claim him for a very old friend, and he was pleased to see him so well and so ready to give the time and trouble necessary to write such a practical and useful Paper.

Mr. WOODWARD, in reply, said that at that late hour he was sure he would not be expected to do do more than very briefly refer to the points raised in the course of the discussion. He should think himself indeed an ungrateful man if he did not thank all present for the very kindly way in which they had received his Paper.

He was himself in the habit of criticising, and he expected criticism, and if he hit hard he hoped that he did so without any feeling but a sincere and honest desire to point out what he thought was wrong, in whatever quarter that wrong existed.

Many speakers agreed with him that tramways outside London, at least, would be very beneficial, and Mr.

* The History of London, and a plan of the street referred to, are in the Library of The Institution.

Stenning thought, as did many subsequent speakers that the Embankment would be disfigured if a tramway were allowed to run along that magnificent thoroughfare. He thoroughly agreed that, although it might be convenient that tramways along the Embankment should join up the northern and southern lines, it would spoil one of our most beautiful prospects and completely destroy that magnificent curve of river bank. There was no view in the world, so far as he knew, at all comparable with the view from Westminster Bridge, with the Abbey and the Houses of Parliament on one side, and on the other that magnificent sweep of embankment terminating in one of grandest cathedrals of the world, St. Paul's, and he should be very sorry to find that great thoroughfare disfigured by tramways.

It was pleasing to him to be reminded by Mr. Chatfeild Clarke that, when he read his Paper 20 years ago, Mr. Clarke's father seconded the vote of thanks, as his son had done the other night.

He gathered that Mr. Pilditch was in favour of arterial thoroughfares through London, and thought that motor omnibuses would not ever be cheap enough for long distances. He did not really know why. He believed that motor omnibuses were in their infancy and would be immensely improved in the near future. He felt sure that, when they were perfected, they would be the best possible vehicles for London, or at all events for the central parts of London, because of their power of serpentine movement, instead of adhering to the strict lines which a tramcar must necessarily follow.

With regard to the little matter in Eccleston Square, of which Mr. Pilditch spoke feelingly as a distinguished member of the Corporation of Westminster, he could only say again that the idea that a man could not put

up a little screen to shelter the guests arriving at an evening party, without giving formal notice, was, he thought, ridiculous.

The Report of Sir George Bartley, which was much to the point, had been referred to, and he was sure that all who had read it in the Blue Book must have done so with very great interest. Sir George Bartley's idea was to have two grand thoroughfares, but he thought that, to-day, we wanted something immediate. Everyone was losing time and losing patience, and no one could stand the present blocking of traffic much longer.

One speaker had referred to the tendency of cabmen, if possible, to go down Fleet Street instead of along the Embankment. His own office was in Southampton Street, Strand, and when he had occasion to go to the City he always told the man to go down Savoy Street, but he had to insist on it or he would go on to Wellington Street, where he would most probably be blocked for ten minutes.

Some speakers had charged him with animosity towards the London County Council and the British workman. His great complaint against the County Council was that it was always attempting to do too much, at a most extravagant cost, and did not do it. The British workman, on the other hand, attempted to do nothing, also at an extravagant price, and too often succeeded in doing it.

It was said by Mr. Sabin that the police were too slow to have charge of the traffic, but the police he had in his mind were special traffic constables. He believed that, if the thing were to be done properly, the traffic policemen should be mounted and specially trained, as the present police had never been, to deal with all ob-

struction, and, if necessary, to turn the horses' heads into the side roads.

He had known the Tottenham Court Road, of which Mr. Sabin spoke, for many years, and he was sure that for the last 10 years the junction of Tottenham Court Road with Oxford Street had hardly ever been free from blocking.

Circular routes were advocated by Mr. Hudson, who also deprecated disrespect for the old horse trams. He was far from underrating them or the electric trams, and he did not blame the London County Council at all for favouring trams five years ago. What he wished to insist on was that the London County Council was a body which, in his opinion—and he had some knowledge of them—having once made up their minds, extravagance or no extravagance (as in the case of the steamboats), that they were going to spend a million or 10 millions of the ratepayers' money, would incur the cost whether it was subsequently found to be expedient or not. He suggested that the London County Council should be asked simply to stay its hand until it was found whether or not the motor omnibus was a success in the streets of London. If an ordinary individual contemplated a certain expenditure, and the possibility arose of a better course, he would stay his hand and wait to see whether it was necessary.

It would be found, notwithstanding all that could be said, either in that room or in the Press, or anywhere else, that the County Council, backed up as they would now be by gentlemen in another place, not a thousand miles from where he stood, would incur that expenditure in spite of the fact that that unfortunate unit, the middle-class ratepayer, was getting rather tired of being

mulct in such tremendous and, in many cases, unnecessary expenditure. That was the great point of his argument.

When Mr. Walter Beer spoke of the traffic being carried at high levels, he supposed that he suggested the construction of a viaduct, but, if so, he did not quite know where the recoupment would come from houses planted against a viaduct.

With regard to recoupment, as he had said in his Paper, it was not easy to see, considering the expenditure on Aldwych and Kingsway, where the recoupment had, in that case, come in up to the present.

He was very pleased to see Mr. Maccassey present, because all who had studied the Blue Books containing the Commissioners' Report must agree with him that Mr. Maccassey's share in that work was of a most valuable character, but the amount of labour, thought, and anxiety that must have been involved, only those who had done a small portion of such work could appreciate. He felt it a great advantage to have the assistance of such a well-informed and vivid mind in the discussion of the subject, and he hoped that Mr. Maccassey would be connected with the Traffic Board or Tribunal which he thought it was generally agreed should be formed.

Such a tribunal must of course be independent of the London County Council or any other existing body, and should have very great powers for immediate control, with a view to effect immediate results. The red tape of officialism that surrounded many public bodies was not wanted, but if a thoroughly independent board, not composed too largely of noble lords who knew nothing about the matter, were promptly appointed, he thought its appointment would fully justify the labours of the

Royal Commission. It was suggested by Mr. Assiter that some assistance would be got from the State. He would be very glad to think so, for he thought some assistance would be needed from somewhere. He could not say that he relied much upon the hope, for he believed that the State was already indulging in expenditure in other directions. Then Mr. Assiter said that London was for the citizens. So it was; but there was no reason why the citizens should not wake up and put an end to the needless obstructions which now made locomotion so difficult or even impossible. It was simply a matter of supervision, and all architects and surveyors in that room knew that, if one did not supervise any work, it was likely soon to get into a hopeless condition.

The migration of factories from London had been referred to by Mr. Nicholson, and if municipal expenditure continued to be as extravagant as it had been, he would find that soon all the factories would be compelled to go out of London, because they could not afford to pay the rates. Then Mr. Nicholson differed from him with regard to the British workman. That was not the place, but if he could have half an hour alone with him, he thought he could tell him possibly more of the British workman than he knew, and might, he believed, persuade him to agree with him on the point.

He was glad to hear the remarks of his old friend Mr. Penfold, if he would permit him so to refer to him. It was so unusual for Mr. Penfold to give the Members present at a meeting the benefit of his experience, that his remarks that evening were especially welcome, as was his kind reference to himself and his Paper.

He would again, in conclusion, thank all present very much indeed for the way in which they had received his Paper, and would venture to remind them that there

were two points he specially wished to emphasise—one was that it was essentially necessary to press forward the formation of the tribunal he had referred to, and the other that all should do whatever was possible to persuade the London County Council to stay its hand, until it could be determined by experience whether the immense expenditure foreshadowed in the Report was necessary or not.

The Meeting then adjourned.

PAPER 319.
No. 497.

# THE EDUCATION ACT, 1902.

BY J. W. WILLIS BUND (ASSOCIATE).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, April 23rd*, 1906.

CHARLES BIDWELL (President) in the Chair.

Let me at the outset put an end to any feeling of alarm that the title of this Paper may cause. To the many very controversial points that arise under the Act no allusion will be made. The question will be approached from a very different standpoint. It has been my fate to see something of the working of the Education Act, 1902, and to have to deal with questions that are well worthy the consideration of all engaged in the management of landed estates, to whatever political school or whatever religious denomination they may happen to belong.

Whatever the changes the new Government Bill may ultimately make will not affect the matter from this point of view. The great question that has to be considered is that a new charge has been placed on real estate, equal in many cases to the whole amount of the county rate before the passing of the Education Act. Can this charge be in any way reduced? We are so accustomed to the wail of the ratepayer that we have ceased to regard it. This Act, however, forces us to consider the effect of the burden of rates upon the

rental of land, and not only this, but also the indirect effects that will be produced in its tendency to increase the great peril of to-day, the movement of the rural population into the towns.

It will be said that the effect of the Act of 1902 was merely to make the Elementary Education Act of 1870 universal. To some extent this is true if elementary education only is regarded. But the Act deals not only with elementary but also with higher education, which is also placed on the rates. It is true that the Act does not contain any compulsory power to make County Councils carry on higher education, but unless the Councils do something to train teachers, which is part of higher education, they will be unable, except at greatly increased cost, to fulfil their obligations as to elementary education, so that, while nominally secondary education is not compulsory, practically it is. The position in which the County Councils find themselves is therefore:

1. They are compelled to provide, staff, and equip such public elementary schools as the Board of Education may consider necessary for their area.

2. As an incident of this they have to take over the debts and liabilities of the old School Boards.

3. Although not legally compelled, they are practically obliged to provide higher education for their area.

It is quite true that Parliament has recognised the great burden they have cast upon land in making it primarily liable for providing for elementary education, by giving far larger grants in aid than formerly, yet these grants fall short by at least sums varying from 15*s*. to 30*s*. a head in the cost of educating the scholars. If each child costs an average of 55*s*. per head, and the grants on children attending public elementary schools

average 40*s.* per child, on 5,163,514 children an annual charge of at least £3,098,000, equal to 80 per cent. of the total cost per child for maintenance, is cast upon land for carrying on the schools, quite irrespective of repairs, maintenance of buildings, providing new schools, and carrying out the endless fads of the army of inspectors.

When the Act of 1902 came into operation the debt of the School Boards was over 33½ millions. This has been practically divided, as to ¾ on the old School Board district, as to ¼ on the county. This quarter has added to the annual charge on land outside the old School Board areas no less a sum than £293,125 for interest at 3 per cent., to say nothing of sinking fund.

The officers of the School Boards were transferred to the Council, and it was provided that they were to be paid not less than the actual salaries they received at the passing of the Act, or, if they were no longer employed they were to have pensions. In various cases these officers were past their best, yet they have to receive the same salaries as they did when they were at their best, or pensions for life. To make matters worse, many of the old School Boards and some of the managers increased the salaries of their officers between the introduction of the Act in March and its becoming law in December, so as to be generous to old servants. All this generosity comes out of the pockets of the county ratepayers.

As to higher education, before the Act of 1902 most counties considered they had done their duty towards it if they applied the Customs and Inland Revenue moneys received under the Act of 1890, usually called the "Whisky Moneys," for this purpose. It was quite the exception for any county to levy a rate as well, and some counties did not even apply the whole of the whisky money. Now they are compelled to apply the whole,

and can levy as well a rate up to 2*d.*, but the new Bill proposes no limit to the rate. Roughly then the charge thrown on land is:

1. The maintenance of elementary schools and the provision of new ones.

2. The proportion, usually $\frac{1}{4}$, of the debts of the old School Boards.

3. Some provision for higher education.

These have created new rates on the counties, varying from 6*d.* to 10*d.*, so the county ratepayer naturally does not look favourably on education.

The disfavour is increased when it is remembered that the Royal Commission on Land, which reported in 1895, after inquiring into the system under which taxation is raised for local purposes, and whether all kinds of real and personal property contributed equitably to such taxation, and if not what alterations in the law were desirable in order to secure that result, reported that agricultural land was overtaxed. In consequence of this, an Act was passed which gave a grant from the Exchequer of one-half of the sum paid by agricultural land in rates in 1895, as a partial measure of relief.

The Education Act has practically done away with the benefit the 1895 Act gave, so far as the county rate is concerned. If, at the passing of the Education Act, 1902, the county rate was 6*d.*, agricultural land paid 3*d.*, but as the Education Act has added at least 6*d.* to the county rate, the last state of the county ratepayer is far worse than it was in 1895 when he paid 6*d.*, and when a Royal Commission said relief was urgently needed and Parliament granted it, for he now pays 3*d.* + the new 6*d.*, but less the grant under the 1905 Act. The county ratepayer says, and not without reason, that he is the victim of misplaced confidence.

One favourite fallacy is that the rate in the £ being the same over all the county, it presses equally on all alike, whether the ratepayer lives in town or country. But this was shown by the witnesses, before both the Commission on Land and the Commission on Local Taxation, not to be so; ability to pay, as indicated by the income derived from the rated property, must be taken into account.

The Commission on Land reported that "to place "agricultural lands in their right position as compared "with other rateable properties, it is essential that they "should be assessed to all local rates in a reduced pro- "portion of the rateable value." If the existing precedents in England and Scotland were followed they would be so assessed at one-fourth only of their rateable value. This was the principle to be applied when agricultural land received direct benefit from the rates as for instance in the case of highways. Cases where the benefit was to the nation as a whole, not to the land as land, should, the Royal Commission on Local Taxation said, be more generously dealt with, their idea being that, in fixing the liability of land towards local taxation, not only should the amount of the produce and profit derivable from land be regarded, but also the relative extent to which benefits accrued to the property and its occupier by reason of the expenditure incurred.

The Commissioners say that, having regard to the inferior ability of the agricultural ratepayer to pay, as compared with the urban ratepayer, and the meagre extent to which he is benefited by such a charge as education, a charge for a matter that does not increase the value of the rateable property in agricultural districts, he should pay much less than the urban ratepayer. This principle the Education Act wholly ignores, and hence

much of the soreness that is felt at the education rate. A farmer is charged equally for the support of a secondary school if he resides 20 miles from it as is the ratepayer who resides next door to it. The farmer pays for educating the urban ratepayer's children, but has to get his children educated at his own cost; yet both contribute the same sum in the £ to the rate, as it is said that equality is equity.

There can be no doubt that the rural districts are paying far more to education than their proper share, for (1) they do not get the same advantage out of the expenditure as do the urban ratepayers, for they cannot take advantage of the schools they pay to build and carry on; (2) their property is not in any way benefited by the expenditure, while the letting value of urban property is increased by cheap educational facilities. This particularly applies to higher education. This is a new charge on land, first in effect made compulsorily by the Act of 1902. It is true there is a limit to the charge, but this it is proposed to remove, and, even if it is not removed, an extra 2*d.* rate is a serious burden on agricultural land, especially when land receives no direct benefit from it. This does not merely affect farms, it affects other classes of property as well; why, for instance, should railway shareholders supply higher education for next to nothing to artizans'children.

Another point which causes much discontent is often forgotten: the incidence of the rate. In urban districts the rates are mainly paid by persons whose assessments do not exceed £100, and so the sum demanded is not so very much; but in county districts the assessments are much higher, and there are fewer ratepayers, with the result that each ratepayer has more to pay, and the burden of the rates is more felt. A man will grumble

and pay £1 without much difficulty, but when asked to pay £10 it is a very different matter.

If the education rate were likely to remain at its present figure, the ratepayer would possibly get used to it, but it is quite certain it will not. He would be a bold man who would say what the education rate will be ten years' hence, and it is this prospect of the ever-increasing charge on the agricultural ratepayer, who has to pay alike in good years and in bad years, which is causing this great discontent.

The chief causes from which the rates will rise are following:

1. The provision of new schools. Prior to the Education Act, 1902, the space required in a school was usually 8 feet per scholar. Now in all new schools, and in all alterations of existing schools, which the Board treat as being practically providing new schools, 10 feet per scholar is required. Practically the cost of providing schools is £1 per foot, so this means an increase of £2 per place. In some cases this works out very curiously. A large school of 800 children was built, with the approval of the Education Department, on the 8 feet basis. The school became full, the Department required that more accommodation should be provided, and a class-room to hold 50 was proposed to be built. The class-room would have been on the 10 feet basis, but the Board said that the addition of a class-room was providing a new school, and the whole school must be put on the 10 feet basis, with the result that after adding the 50 places the school held considerably less than before.

It may be a good thing to have the 10 feet basis in new schools, but to apply it as in the above instance does not tend to conciliate ratepayers, who cannot understand that, when they have been taxed and paid

£375, the three-quarters of £500, they are in a worse position through their school holding fewer scholars than it did before they spent their money.

2. Another point in the provision of new schools is the extravagant way in which the Board require them to be constructed. The favourite idea is a central hall in which no teaching is allowed, and class-rooms opening off it. This adds largely to the cost of construction, the extra roofing alone being considerable. Even in small country schools "marching space" to a quite unnecessary extent is required. The Board will not approve the plans for new schools unless their fads are carried out, and all fads mean extra cost.

But the cost of construction is not the only objection to the Board's favourite central hall and class-room system of schools. To maintain such a school practically requires a larger and more expensive staff of teachers, for each class-room should be in charge of a certificated teacher, while if the children are taught in a large hall, pupil teachers and supernumeraries can be employed. This tends to raise the salaries and increase the charge, but as it comes out of the rates, it is, in the opinion of His Majesty's inspectors, of but little consequence.

3. Since the passing of the Education Act the demands of H.M. inspectors "have increased, are increasing, and ought to be diminished." Schools that before the Act were passed with commendation, are now reported in dire need of repair. Schools built with the approval of the Board, as to all the sanitary, heating, and ventilating arrangements, and against which, up to 1902, no word was said, are now stated to be in grevious need of reconstruction. It is almost ludicrous to refer to inspectors' reports before 1902 and after 1902 on the

same school. As long as the schools had not the county rate to fall back upon, a very different standard was required from that now sought to be set up. To give one example: before 1902 divisions in boys urinals were not insisted on, now in the urinals of all boys over six they are said to be absolutely necessary.

This foolish (no other term is possible) action on the part of H.M. inspectors is the cause of great difficulty in carrying on the schools. Complaints are continually received and questions asked how it is that schools cost more now than ever. One is sometimes inclined to wonder if secret instructions have not been given to inspectors to raise their requirements so that managers of non-provided schools cannot carry them out, and thus cause schools gradually to become Council schools. The position of the managers of non-provided schools has become one of very considerable difficulty. As a rule they have very small funds and the inspector makes very large demands on them, and these demands managers naturally try to put off on the County Council, who, under the Act, are liable for "wear and tear." Members of The Institution have probably a very good idea of what this expression means, although it might be difficult to define it; but few of them would be prepared to support such a claim under it as I met with the other day. A domestic cat belonging to the school fell into the school well: the managers said it cost 5*s*. to get the cat out, and charged it to the Council as "reasonable wear and "tear."

The Board of Education are only one of the authorities that deal with education. The other, the Local Government Board, have still stranger views, not only as to the meaning, but also as to the cost of carrying out the Act.

As to providing new schools they have given this startling decision. The old School Boards could borrow money for building schools, repayable over 60 years. The Education Act transferred to the County Councils all the powers of the old School Boards, one of which was this power of borrowing money for 60 years. County Councils, under the Local Government Act, could not borrow money for County Council purposes for longer than 30 years, so the Local Government Board have refused to sanction loans for new schools for a longer period than 30 years, and that notwithstanding the transfer of all the powers of School Boards to the Councils, for they allege the power to borrow for 60 years cannot be exercised by the County Councils, as, by the Local Government Act, they cannot borrow money for county purposes for more than 30 years, and they say a school is a county purpose.

To anyone but the Local Government Board it would have occurred that the original restriction was for County Council purposes as defined by the Local Government Act, 1888, and the transferred powers were for education purposes, a new duty carrying with it new powers and quite a different thing from the old powers. The result is curious: a School Board borrowed money for the erection of a school repayable in 60 years; the County Council has had to enlarge the school and borrowed the money for doing it: the Local Government Board say it must be paid in 30 years, with the result that the annual payments for the enlargement are greater than the annual payments for the erection of the school. This is one of the points the new Bill proposes to set right.

Another construction of the Act by the Local Government Board is still more remarkable. Section 18 of the

1902 Act provides that part of any capital money spent on schools may be charged upon the area on which it is expended. In the purchase of sites for country schools, which often do not come to more than £100, the Local Government Board hold that if the Council do not borrow the money they cannot charge it upon the area, on the ground that moneys paid out of income are not capital moneys. In one case a site was purchased for £100; £75 was charged on the area served and £25 on the county. The £25 was included in the rate for the year and paid off; the Local Government Board auditor proposed to disallow it on the ground that there ought to have been a loan for it, and it should be repaid by annual instalments. Imagine the state of the county finance 20 years hence if for every school site, every additional classroom to a school, every w.c. erected there is to be a loan.

But this is not all; they have gone a step further, and at least should have the credit of being logical. In the case mentioned of the county quarter being paid out of income, they gravely said you can only charge the area with three-quarters of what is actually borrowed; as you have paid your quarter out of income you can now only borrow three-quarters of the remainder. If you had borrowed the whole £100, you could have charged the area with £75. But as you have charged the area with £75, which is borrowed, and paid off out of income £25, you can only charge the area with three-quarters of £75, £75 is the only capital money, and you can only charge three-quarters of what you borrow, not of what you pay. Is it to be wondered at that even the country parson drops into strong language about the vagaries of the Local Government Board on education expenditure? This is another point on which the new Bill proposes to correct the eccentricities of the Local Government Board.

Playgrounds are another frequent source of friction. The inspectors are always complaining of the state of the playgrounds, and usually suggest that they should be asphalted. But this is an expensive process, and often quite beyond the managers' powers. In most cases the playground has been worn into holes by fair wear and tear, but the Local Government Board say that the playground, although it belongs to the managers, and the managers are obliged to allow the children to use it without charge, is not, when worn out by such use, to be repaired by the Council, wear and tear being confined to the rooms of the school house. So the managers cannot get one farthing from the Council towards the repair of a playground, but must keep it in repair out of their own pockets.

It would be wearying you to go on citing cases of the difficulties that the Government Departments raise. If their object is to exasperate the ratepayers, they are doing it most effectually. Some others will be mentioned later, but so far as elementary education is concerned, those that have been mentioned will show why the charge for education is so rapidly increasing, and why the discontent of local authorities is rising in the same proportion.

The debts of the old School Boards are also a fertile source of discontent. It is very hard to get an agricultural ratepayer to see why he should pay any part of the cost of school buildings erected some time back in a town miles away from him. It is bad enough to have to maintain them, but to pay for old buildings, as some of them are, which require constant repair, is, he thinks, an unmitigated hardship. It cannot be denied that in some cases he has good ground for complaint. In spite of all that may be said in praise of

the old School Boards, with regard to the small country School Boards one thing is certain, that, either because the members got the work done locally, or because they so cut down the cost that a man had to cheat to make it pay, or from some other cause, the schools they built are examples of the worst work of the jerry builder and the inconsiderate architect. Let me cite three cases. (1) In one school the only ventilation of the infant school is by a window which opens into the boys' urinal. (2) A school was built on the site of an old farmyard, and no water fit to drink can be obtained from any well on the school premises. (3) The school drain is a 6 inch pipe. After being carried for a short distance it discharges into a 4-inch pipe, and these pipes are used for the rest of its length. To make it the more aggravating, no persons are more keen in pointing out these defects than the members of the old School Boards who made them, and the Government inspectors who approved them.

The ordinary ratepayer also as a rule objects to secondary education as now carried on. There is a good deal to be said for his view. He says he is paying to train scholars and teachers who will never be the smallest use to him, and may not even be so to the county. He also thinks that if the children were not so highly educated they would live more in the country. No one can deny that there is something to be said for this argument, however much we may disagree with it. But it is clear that the authorities must press on higher education if for no other reason than this—that, if it is neglected, the supply of teachers will fall off, and the ratepayers will have to pay higher for carrying on elementary education.

But a further difficulty arises. Ratepayers say that if

we train teachers and pay the cost of training them out of the rates, we are entitled to have some part of our money back and to insist that the teachers so trained shall serve in our schools for such a time as will in some degree recoup us. This way of stating the case is plausible, but it is strongly resented by the teachers; they say that it is a restriction on individual liberty to make—even if you legally can make—rules to bind a person to live for a period in a particular district, especially when it is quite possible that person could, for the same work elsewhere, earn a higher salary if he were free to take his labour where he thought best. This is a bald statement of the case; it is generally put in other ways—slavery, liberty of the subject, and all the usual rhetorical expressions of that nature with which we are not wholly unfamiliar. But there is a great deal to be said from the teachers' point of view that he should be able to go where he can earn the best wages. Yet if this is to be so, the only possible inducement to make the ratepayer agree to train teachers is gone. Why should rural ratepayers train teachers for large towns where higher salaries are paid. It means that either salaries must be increased to get good teachers, that is, higher rates must be paid, or no teachers will be trained. The ratepayer says it is better to train none and pay higher salaries, than to pay to train and, at the same time, to pay higher salaries; and it is not certain that, from his point of view he is not right.

At present there are in the country practically very few secondary schools, as the Board of Education uses the term.

What has been done so far is to subsidise the old grammar schools on the condition that they will take

county scholars. This, however, in most cases is only a temporary expedient. In the near future, if secondary education is carried on, new schools will have to be provided. The provision of these schools, having regard to the requirements of the Board of Education, is a most serious matter. In ordinary cases the cost may be put at not less than £35 a place a sum which in most places will be practically prohibitive, even when it will be legal for a County Council to raise more than 2*d.* over its whole area. At present the maximum is 2d.

An Urban District Council may also lay a penny rate on its district in addition to aid in supplying secondary education within its area, but a Rural District Council, however anxious they may be to do so, have no such power. It is therefore clear that the moneys to be raised from the rates are strictly limited, and will not go very far in providing secondary schools at £35 per head.

Here again is a difficulty raised by the Local Government Board. The Act contains a power to charge the area served by a secondary school with the cost of that school, and clearly, if a school has to be built, it would be only fair that the neighbourhood served by the school should pay for it. A difficulty, however, arises. The early part of the 1902 Act, Part II., says distinctly that not more than 2*d.* can be raised by a County Council. This was much debated. Section 18, which gives the power to charge the area, was not reached until the legislation by closure began ; it is consequently in direct conflict with the earlier section, as no limit as to cost is here mentioned. To reconcile the two is not easy, but the Local Government Board have evolved a most ingenious way. If, they say, the rate does not reach 2*d.* over the whole county, you may have any sum you like

on a particular area, but, if it reaches 2*d.* over the whole county, you cannot have more than 2*d.* on any area.

The result is rather startling. If the full rate of 2*d.* is required for maintenance, you cannot borrow for building a secondary school and charge the cost on the area, as it would make the rate more than 2*d.*, but if the rate over the whole county is $1\frac{63}{64}$ or any other fraction below 2*d.* you can borrow whatever sum you want and charge it on the area, even if it raises the rate to 6*d.* or 1*s.* In a particular case where a secondary school is wanted, and will be paid for by loan on the area served, the Council intended to have levied its full 2*d.*, but, in consequence of this decision, they will now levy a rate of $1\frac{15}{16}d.$ on the whole county and 4*d.* on the area. The Local Government Board should be congratulated on this reading of the Act, which compels County Councils to effect a saving in the interests of the county ratepayer as a whole, however hard it may be on parts.

One or two other points on the working of the Act may be mentioned.

In some cases it becomes necessary to put up temporary schools; these are usually corrugated iron buildings. It would hardly have occurred to anyone that the same by-laws that regulate permanent buildings should be made to apply to these. Yet such is the case in the view of some sanitary authorities, and they are supported by the Local Government Board. This procedure adds to the cost considerably, but the rate is a county and not a district rate, and neither the district nor the Local Government Board seem to mind what the county pays for elementary education.

It is difficult to get localities to understand that an increase in the county charge ultimately affects

them. In no matter is this more strongly shown than in the assessment of schools. Formerly such schools as were liable to be rated were assessed at a very low sum, a school not being considered property that even a hypothetical tenant would desire to rent. Now assessment committees have, wherever possible, raised school assessments to something like the full value, forgetting that in most cases the rate will come out of the pockets of the county ratepayers. It is one of the best instances of the jealousy and ignorance of the smaller assessment committees that while the Voluntary Schools Act, 1897, to a great extent exempts those schools from rating, and so they cannot be touched, yet the committees will put up to the highest possible figure the assessment of Council schools, although the rate comes out of the county rate to which they contribute. But, as the assessment of every new building relieves the rate upon land to an infinitesimal extent, advantage is taken even of this.

Another anomaly under the Act will possibly be put right in the new Bill. No provision in the Act of 1902 was more calculated to sut down expenses than the power of providing means to convey children to schools, and so get rid of that most expensive kind of school, the small school with under 50 children. If the authority were to build or provide a school, the cost could be spread over the area which the school served, but if, instead of doing that, the children were collected and conveyed to the school, the cost of conveyance and collection could not be charged on the area served, but must be borne by the managers who carry out the conveyance and collection. Consequently the provision, if acted upon, would enable some parishes to place the cost of providing their school accommodation on their neighbours.

This decision has checked a most useful attempt to give up the idea that each parish must have a school of its own and to provide that schools should be so placed that they may serve the widest possible area, and so enable the number to be reduced. From an educational point of view a well staffed, well found, large school is far better than a small school, which must be ill staffed and cannot be well found.

To show the difference in cost. In a district with 11 schools, 123 teachers, 5,645 children on the books, that is an average of 515 children to a school, the cost per child is £2 14*s.* 5½*d.* In another district in the same county where there are 10 schools, 43 teachers, 878 children on the books, an average of 87 to a school, the cost per child is £2 18*s.* 10½*d.* or 4*s.* 5*d.* more per child. It may be put in another way—the average cost per child in Worcestershire is £2 17*s.* 4*d.*, on an average attendance of 42,106 children. The county is divided into 15 districts for education, 12 rural and 3 urban; only one of the urban is above the average, while only three of the rural are below it.

One more instance may be cited of the way in which the Board of Education act quite heedless of cost. A secondary school is much wanted in a part of Worcestershire adjoining Birmingham. After some difficulty a site was selected, which would serve the whole district, but, as it had to be near the people who would use the school, the price of the site was high, 6*s.* a yard; it was agreed to buy 1½ acres at that price, and, as the school was for 250 at £40 a place, it would be a considerable charge on the ratepayers. The plans of the site were sent to the Board of Education for their approval. This is their reply:

"The site is reported to be convenient and within

" easy access of the more populous districts. Its area, " however, is only a little over one and a half acres, and " having regard to the size of the school which will be " required for the growing needs of the neighbourhood, " does not afford room for organised games, such as " cricket, football, and hockey. It is very desirable that " such provision should be made if possible, and it is " therefore urged that steps should be taken to secure " a site between three and four acres." The acre and a half will cost £2,178; assuming that a site could be got at about that price, the three or four acres that the Board talk of with such a light heart will cost over £4,000 at the very least. The local authorities think that the site of a secondary school in which young ladies may play hockey will be too dearly purchased at £4,000 when the building will cost £10,000. The country ratepayers would pay a reasonable sum, but it is doubtful if they will pay this, so the Board of Education by their fads and their folly are preventing the provision of a school which is much wanted. How long Parliament will allow an Act to be thus administered it will be interesting to see. But if it is found impossible to get ratepayers to agree to carry out proper provision for education the fault is that of the Board.

There are other portions of the Act and other proceedings of the Board to which attention might well be directed, but I must only tresspass on your time in mentioning one or two very important points on the effect the Act is having and will have on the future of the country.

1. Will the Act promote education in rural districts?

To this, in my opinion, the answer is No. The cost of elementary education is so great that the rural ratepayer will use his utmost efforts to reduce it, and the most obvious ways that occur to him are to limit the

number of children in the schools, and to get the cheapest possible teachers.

Country schools were most desirous of excluding children under five, not from reasons of health, but to avoid enlarging schools and to cut down cost. They are also most desirous of having children leave as early as possible, alleging the necessity of making children leave early to work on the land. The real reason is to keep down the cost of the schools by reducing the school period of each child to the lowest possible limit. From an educational standpoint, for a child to have merely the minimum amount of school time that can be given, cannot be good. One instance may be cited. At a meeting of a Chamber of Agriculture on the 25th inst., at which the new Bill was considered, a member moved a resoluton regretting that the Bill did not give increased facilities for removing children from school at an earlier age in rural districts, a course which would permit them to commence the practical and more important part of their education while still at receptive years. He said that the elements of country work in which those children would have to be engaged, were never acquired so well as before the age of 13 or 14. He suggested that children in the country might leave at 11, but continue attendance at evening continuation schools up to the age of 16. The discipline would be good for them. The motion was carried.

The other way is to cut down salaries of teachers. If a teacher can be got at a very low figure, the country managers always do so, quite independent of the teaching capabilities. The great danger at the present day is that the County Councils seem likely to produce in the near future a stock of ill-educated teachers, who will not be good enough for the large town schools, but who, as

they will be cheap, will be employed in the country schools.

The result of the excessive requirements of the Board of Education will therefore be the smallest possible amount of schooling and the cheapest possible teachers, neither of which state of things will promote education in rural districts.

2. What will be the effect of the Act on the social state of the rural districts?

As now administered by the two Government Departments, it will tend to increase the migration from the country to the towns.

Building cottages means increased population and increased school accommodation, which mean increased rates. Keep down cottages and you keep down rates—such is, and will be, the farmer's view. If he can keep down his rates by not asking his landlord to build fresh cottages, he will not ask him. Then, from the other side, the labourer, besides the other attractions to the town, will recognise that he can get his children better education, possibly meals for nothing, and other advantages. The old people may stay, but the young ones will go. In fact, the Education Act offers a premium to young married couples to leave the country for the town.

3. What will be the effect of the Act on the value of land in rural districts? It will materially depreciate it. With the present state of prices, it will take but a small further rise in rates for tenants to ask, and with reason, for a reduction in rent.

Let me take two cases which will show the serious nature of the position.

(i.) A parish in which the largest ratepayers are two brickyards, the main population being men who

work in the brickyards, requires further school accommodation, which will have to be provided. The brickyards are highly assessed, but are not doing well. The sum which the parish will have to pay for higher education, for general elementary education, and for a special rate for their new schools, will be about 15*d.* in the £. This may cause the brickyards to stop, and if so a large number of the houses will become void. What the rate will be on the remainder of them in that case one would rather not consider, yet we are face to face with the fact that in this case the effect of the Education Act will be to further depress the trade of the district, to increase the old rates, and so depreciate the value of the property to a very considerable extent.

(ii.) In an agricultural parish, the whole of which belongs to one man, the cottages are all old, worn out, and unsuited to modern requirements. The rateable value of the parish is small and is decreasing. By excluding infants the necessity of a new school has been avoided, but if new cottages are built a new school will become a necessity. The landlord says that, with building by-laws and other requirements, to rebuild the cottages will cost such a sum as may, if he is lucky, give him from $1\frac{3}{4}$ per cent. to 2 per cent. on his outlay. He is now getting $3\frac{1}{2}$ per cent. for his money. If a school for 75 children were added it would reduce his return to 1 per cent. on his outlay. Why, he asks, should he sacrifice $2\frac{1}{2}$ per cent.? He will not do it, and the sanitary authority will close some of his cottages, thus driving the people away from the place.

I have given these two cases, as they are typical of the present state of things and of what occurs under the Education Act. I do not pretend to suggest a remedy. I can only give the result of my experience as

Chairman of an Education Committee, which leads me to regard the 1902 Act, as now administered from Whitehall, as a source of peril to the country.

Mr. F. G. CHINNOCK (Member of Council) said it gave him very great pleasure to propose a vote of thanks to Mr. Willis Bund for his interesting and most comprehensive Paper, which he was sure would be read with interest by many Members unable to be then present, when, in due course, it was published in the *Transactions*. It touched, in a certain sense, on the Bill which was now causing so much agitation throughout the country. He could not pretend to speak with any authority on the subject, for he had not studied it sufficiently to enable him to pronounce any useful opinion, and in such a case he thought silence was best; but he had his own views on it nevertheless. He quite agreed with Mr. Willis Bund that every alteration of the kind tended to increase the burden on land, which, it was generally conceded, was sufficiently burdened already. The new measure was bound to increase the rates.

On another point he fully agreed with Mr. Willis Bund. He thought the farmers paid a great deal more than their proper share for education, for, although they paid as much, they did not get the same benefit from it, as those who lived in the urban districts. In the parish where he lived in Hampshire, the cost of education was met voluntarily, for it happened to be a very large parish, with many people living in it whose income was not derivable from land alone. The schools were now supported by voluntary contributions, but there was, he feared, a prospect that they would soon be con-

fiscated—he did not hesitate to call it confiscation—and the rate chargeable on the parish would be an extra burden. But he must not express his opinion on the proposed legislation with which, as Mr. Willis Bund said, his admirable Paper did not deal.

Mr. P. E. PILDITCH (Fellow) said he had very much pleasure in seconding the vote of thanks to Mr. Willis Bund for his excellent Paper, and he could only express his regret that there was not a larger number present, especially of the country Members, at whose particular request the afternoon meetings had been instituted, and to whom, one would imagine, a Paper of this kind, dealing largely with rural districts as affected by the Education Act, would be of the greatest interest.

It was indeed a relief to hear public education discussed from any other point of view than that of the interminable religious question, of which the whole country had heard so much, and would, he feared, hear a great deal more during the next few months. However important the religious aspect might be to the country, no doubt, as Mr. Willis Bund said, the ratepayer, and particularly the rural ratepayer, had found the financial aspects of it quite as difficult to reconcile himself to as the religious. He had himself lately had occasion to come into contact with the working of the Education Act in two counties. In one county remote from London, in a purely rural parish, the Education rate had been very small indeed, ranging from 1*d.* to 2*d.* in the £, but after the Education Act of 1902 it went up to 7*d.* or 8*d.*, and without any serious alteration in the character of the education given.

The Education Act of 1902 was no doubt, from many points of view, an excellent Act, educationally; but it

had the unfortunate effect that it set up two sets of masters over the people administering education locally. Instead of having only the Education Department in Whitehall to deal with, after the Act was passed, they had a new set of masters with expensive procedure and machinery, namely, the County Councils, to satisfy, and that was, he thought, one great cause of the dissatisfaction that had been expressed. He was convinced that the financial burdens so placed on the ratepayer had much to do with the defeat of the late Government

Another point which Mr. Willis Bund made was that the education given in the country districts, though it had to be paid for at a considerable price, was not really, in its essence, what the people wanted. It was not practical enough. The farmers and ratepayers generally were called upon to put their hands in their pockets and pay for something which they thought had a tendency to drive labour away from the land.

It was not possible to put back the hands of the clock and expect the country to depart from the attempt it was making to educate the whole population, as America and Germany did; but it did seem to him that a code suitable to the rural districts ought to be, and could be, drawn up. One or two small Bills had been before Parliament for some years past, though they had not had an opportunity of being discussed, which aimed at more practical methods, by which some of the details of country life could be taught rather than mere book learning, for which the farmers found the money, but from which they got no advantage, but rather the contrary.

It was, he thought, generally admitted that the man who found the money should have something to say as to its expenditure.

He was sorry to hear Mr. Willis Bund say in the concluding sentences of his Paper that he had no solution to offer. It seemed to him, indeed, unfortunate that anyone with such wide and long experience as Mr. Willis Bund, who had studied the subject from within as he had done, could suggest no solution of the evils which had been so carefully and thoughtfully pointed out. He hardly dared, after Mr. Willis Bund's admission, to suggest any solution, but it seemed to him, that in addition to endeavouring to curtail some of the extravagances of the Local Government Board, the most practical way to deal with the matter of the heavy increased expenditure would be to largely increase the subvention from the general taxpayer for the relief of the local ratepayer. It could not be expected that the Government would put the whole amount on the national shoulders, for he supposed that would encourage local extravagance, but he believed there was reason for a strong demand to be made by those on whom the burden rested for a further subvention in aid.

Mr. W. C. F. ANDERSON (Visitor) said he had much pleasure in supporting the vote of thanks to Mr. Willis Bund. He was, he supposed, more directly interested in the subject than most of the Members present, for, as Secretary to the Education Committee of the Berks County Council, he knew exactly where the shoe pinched from an administrative point of view, and he remembered parallel cases to nearly every one mentioned, especially with regard to the views of ratepayers and the increasing stringency of the Board of Education requirements.

It was probably want of time which had led Mr. Willis Bund to omit one point with regard to the 8 square feet per scholar. The Board of Education never moved together as a whole. Its building department, for instance, took several years to learn what the other departments were doing. The 8 feet applied to the time when the children left school at 10 or 11 years of age, while now about 13½ years was the rule. The children being now retained longer, naturally increased in average size, and it was quite impossible to put them into the 8 square feet which were enough for the younger ones. The number attending also increased, and when the Board of Education asked for enlargement it was often found that the enlargement would not add to the school accommodation. Great difficulty often arose from the fact that the Board of Education was so particular in regard to the rooms that a school might be found with one "recognised" room and two "unrecognised." Probably there was enough room for the children, but one or two of the rooms might be a few inches short of the standard, and those rooms could not be "recognised" as affording sufficient accommodation.

As to playgrounds, he thought Mr. Willis Bund was not quite fair to the Local Government Board. He believed the confusion was really due to the wording of the wear and tear clause of the Act, which said "any wear and tear in the use of any room," in the school house. If it had only said "the school house," the case would have been met. That point had misled several County Councils, his own among the number, who, at first, had been quite prepared to pay the expenses of repair to playgrounds.

Another point on which inspectors had bothered all

the authorities, especially during the last year, was the system of ventilation. In the case of every little school, with perhaps 19 children, the managers were asked to provide a "system of ventilation." They might attempt to ventilate by keeping windows open winter and summer, but that was not regarded as a proper "system" of ventilation.

With regard to playgrounds being provided, he knew a case where, although there were several acres of village green immediately adjacent to the school, the managers had been called upon to provide a playground.

As to the exclusion of infants, his own committee had passed a resolution excluding infants under 5 years of age, but this was not done merely to avoid asking for enlargements, but mainly on account of the physical disability of the children. For children under 5, schools must be at very short distances apart, but after 5 years of age, they could walk a mile to and fro, and so the necessity of conveying them was got rid of. Again, in the case of little children under 5, it was necessary to provide special rooms and special teachers, and for the kindergarten method to be rightly carried out one teacher was required for every 5 or 6 children, and, as those children earned the smallest grant, it would not pay to take them.

THE PRESIDENT said that, speaking as chairman of an education committee since the Act had been brought into operation, he was sorry he could not altogether agree with Mr. Willis Bund. He was afraid that Worcestershire must be suffering under considerable complications with regard to the rates. In the Isle of Ely, in which he lived, there had been no friction in the working of the Education Act, either in the case of officials or of

employers of labour. From the latest monthly returns he found that the attendance was 94·8, which, he thought, was extremely good.

In his district, which was a purely agricultural one, a by-law had been adopted giving the children an opportunity of going to work during the best time, *i.e.* during the harvest. In the case of any child over 11, who had passed the Fourth Standard, the parents could give notice to the local authority that the child was to be employed in agriculture, and it was provided that such child, between the ages of 11 and 13 should attend school 250 times in the year, during the period from the 1st November in any year to the 15th July next ensuing. That meant that except during that period a child might be employed in agriculture.

As far as his experience went, none of the difficulties which Mr. Willis Bund referred to in his Paper had arisen. He agreed with him that many fads of inspectors had to be contended with. It was a very common thing for an inspector to dictate all sorts of small alterations, but these were not always carried out, and no very great difficulty had arisen from this omission. But if any real difficulty arose, a small deputation attending at Whitehall would always be treated fairly by Mr. Morant and his colleagues, and their suggestions met in a most reasonable spirit.

Secondary education was, he thought, of the greatest importance to the country, and he did not agree that farmers and others were not getting any benefit from it.

In his county there were three excellent secondary schools which were well attended, and at these the farmers and small shopkeepers' children had an excellent education. The cost of these was met out of the "whisky money."

In past years the whole of this money had not been spent on technical education, and when secondary education had to be organized the Council had a good round sum to work on in starting their schools.

He held the opinion very strongly that teachers should be thoroughly up to their work. It was of great importance that in elementary and secondary schools the teachers should be well trained and fully competent in every respect.

With regard to the matter of repairs to playgrounds, referred to by Mr. Anderson, his own County Council had done some repairs to a playground on the assumption that it was part of the school building, and had to make the matter right afterwards. It seemed a little hard that managers should be called upon to keep a playground in order.

On the question of the migration of the population from the agricultural districts into the towns, he held a very strong opinion. It was well to educate the children of the agricultural labourer thoroughly, but if better homes were not provided they would not stay on the land. His experience was not a small one throughout the Eastern Counties, and in his opinion a better class of home was the real want of the people.

He had found the Education Act up to the present time work well and smoothly. As he said, there was in his district an excellent attendance, and, he was pleased to say, a good education provided. What the future might be no man knew, but when the future came he supposed they would be prepared to deal with it as practical and wise citizens.

He was sure all present would agree with him in thanking Mr. Willis Bund for his Paper, which must do good, and would show the authorities at Whitehall

that, at all events, the Chairman of the Worcestershire Committee had his eye on them, and if the Paper were the means of facilitating business through Whitehall, it would not have been read in vain.

The vote of thanks having been put to the Meeting and carried unanimously,

Mr. WILLIS BUND, in reply, said he was extremely obliged to the Meeting for the very kind vote of thanks accorded him for his Paper.

There were many other points that he should have liked to have dealt with, but the time at his disposal was limited. There were, however, three points that he wished briefly to mention. First, with regard to what Mr. Pilditch had said as to transferring the cost from the ratepayer to the Imperial Exchequer. He quite agreed with that, but the difficulty was that it would only be a partial relief, for a very large number of the ratepayers had also to pay income tax as well, and if the income tax went up the lowering of the rates would not relieve those persons to any great extent.

He was happy to hear of a county like the President's, but he would mention what a real grievance Education Rate was in his own county. In 1903-4, the expenditure on education in the County of Worcester was £92,000: in 1905 it was £132,000; in 1906 £144,000; and it was estimated that for the year 1907, it would be £174,000: so it would be seen that it was a very real burden pressing very heavily upon the ratepayers. Of course the whole of it did not come out of the rates, but a very large proportion did. He agreed with Mr. Anderson that "wear and tear" in the Act applied to rooms in the school house, and not to the house.

The other point to which he wished to refer was the remark by the President, with which he entirely agreed, that it was of the utmost importance to give the teachers the best possible education. He thought it would be simply wicked to compel people to send their children to a school where they would be inefficiently taught. But one too often found that the managers of small country schools would employ teachers at the lowest price in order, as they said, to keep down the rates. He knew of several cases where teachers had been engaged by the managers at a rate so low that one was compelled to inquire why a man should work for the money. It was generally found that there was something against him—some reason why, if he were qualified, he was unable to take a place in a better school. To employ incompetent teachers in a school to which the children were forced to go, and to have to pay the cost of the school at the same rate as if there were competent teachers, would be a misuse of the powers conferred by the Act on the educational authorities, and a breach of the trust confided to them in the interests of the community.

The Meeting then adjourned.

PAPER 320.
No. 498.

# THE EFFECT OF FIRE ON BUILDING STONES.

BY W. R. BALDWIN-WISEMAN, M.Sc.
(PROFESSIONAL ASSOCIATE).

*Read at the Ordinary General Meeting of* THE SURVEYORS' INSTITUTION *held on Monday, May 14th,* 1906.

CHARLES BIDWELL (President) in the Chair.

## GENERAL INTRODUCTION.

Two Papers dealing with fire have been previously read at Meetings of The Institution, one by Mr. C. H. Bedells, Fellow, on "The Insurance of Buildings "Against Fire" (vol. xxxiv., part ix., Session 1901-1902), and the other by Mr. H. Lovegrove, Fellow, on "Regulations for Protection from Fire" (vol. xxxv., part vii., Session 1902-1903).

In the discussion on the latter most interesting Paper, the late Mr. T. Blashill, Fellow, made the very forcible remark, "that no one had really learnt anything from "the great fires which had occurred . . . . even the "great Paris fire was absolutely useless in that respect. "It taught absolutely nothing that was not known before ". . . . Practical men knew beforehand that if fire were "applied to combustible materials they would burn; ". . . . anyone who had ever seen the process of light-

"ing an ordinary kitchen fire had seen all that a "conflagration could teach him." With this remark I most emphatically concur, for the temperature and destructiveness of any conflagration are so entirely dependent upon the plan of the building, the nature and disposition of the material used in its construction, the nature of its contents, the time, location, and cause of the fire, and other incidents, as to preclude all possibility of reduction to any standard formula, and a study of the stresses which a building has to withstand, during and after a severe conflagration, is also so complex a problem as to be practically indeterminate if viewed as a whole; but, if one resolves it into separate considerations of design and material, it is brought more within the bounds of solution and the range of every-day practice in design.

For this reason, I regard as practically valueless all experiments which involve the construction of, say, a model room, and its destruction by fire, when, in many cases, the building material of which it is composed is comparatively fresh, the wall and floor stresses are trivial, and the internal space is utterly inadequate for the generation of a really serious fire. Far more profitable experience would result from a careful inspection of all interiors after the extinction of a fire, for much information as to the temperature of the fire could be obtained by a careful examination of the condition, fused or otherwise, of the metallic fixtures. Thus, for instance, lead melts at 326° C., aluminium at 625° C., and brass at 1,000° C., so that if, on investigation, it was found that the two first-named had melted, and the last-named had not, one would know that the temperature in the places in which they were severally situated exceeded 625° C., but did not exceed 1,000° C.; and by

tabulating the records of the intensity and destructiveness of fires in various buildings of similar plan, structural arrangement, and trade, one would create an almost invaluable record for reference, from which much good must eventually result.

After a most careful and searching inquiry, I came to the conclusion that little or no definite information existed on the question either of design or strength of material, and while it is not my purpose to offer any data on the first question, I hope that Members of The Institution may, from their large experience, assist in the compilation of much exact data, on lines which may be directly or indirectly suggested by my Paper.

## Purposes of the Research.

The purpose of the research was not so much to determine the design of a building for fire resistance, as to estimate the ultimate stability of an edifice after subjection to a severe conflagration, and to afford some small assistance to those who may be called upon to decide whether demolition or reconstruction shall succeed the wrecking influences of a big conflagration.

In brief, the following points were considered :—

First.—The transverse and crushing strength of stone ;

(A) When thoroughly dried in the steam oven so as to expel all absorbed water held in the pores, but not the water of crystallisation ;

(B) When thoroughly soaked in water ;

(C) When subjected for various definite periods to constant temperatures ranging from 500° C. to 820° C., and either slow cooled in air or suddenly cooled by immersion in cold water

immediately upon removal from the furnace, the latter case being intended to somewhat imitate the conditions when a jet of water is directed upon a burning building.

Second.—The expansion of the stone with increase of temperature from 20° C. to 300° C., and the permanent alteration in dimension on subsequent cooling.

For the whole of the data of that part of the research bearing upon expansion and permanent swelling I am indebted to my friend Mr. O. W. Griffith, B.Sc., A.R.C.S., with whom I am collaborating in another research on the physical properties of concrete and ferro-concrete, and who specially devised a most delicate extensometer of novel form and great accuracy for the determination of the data on expansion recorded in Tables 6 and 7 of the appendix to this Paper.

## Historical Introduction.

Although somewhat adverse to the customary historical introduction, I think it might perhaps be of some interest to briefly summarise all the more important, but rather scanty, references to the subject. Pliny states that the Romans quarried rock by heating it and sprinkling vinegar on the heated surface along the predetermined line of separation. Raimondi ascribes to the Peruvians, in the quarrying of the gigantic monoliths $28' \times 13' \times 7'$, used in the construction of Tia Huanaço and other Incarial cities, similar methods, except that the Peruvians, previous to the ignition of the fire, chiselled a groove along the line of separation, into which, after the removal of the combustibles, water was poured; the sudden change of temperature inducing rupture of the stone.

The axial expansion of various crystals, which, in

common with other physical properties, varies along different axes, has been determined by various physicists, and a few results of the more important researches are tabulated in Table 13 B. Researches on the expansion of building stone in broad classes have also been undertaken by Colonel Totten, Messrs. Adie and Bartlett, and the United States of America Engineer Corps, the results of which are summarised in Table 13 A.

In heat resistance, or the depreciation in strength of stone after subjection to high temperatures, there is not, so far as I am aware, any statistical table whatever, and in fact the only tabular statement at all on this question, known to me, is that of Dr. Cutting, detailed below, giving the order of resistance in decreasing ratio of "fire-resisting" material, when water is not applied, viz. :—

1. Marble.
2. Limestone.
3. Sandstone.
4. Granite.
5. Conglomerate.

The accuracy of this table is not at all borne out by the data derived from my research, and from this tabular arrangement I most strongly dissent, since the physical structure of each class and subclass of stone varies so considerably as to preclude any generic grouping such as this list presumes. An inspection of Tables 2 and 3 will at once emphasise this.

There are doubtless many isolated examples, in personal experience, of the relative effects of fire on different stones in the same edifice, but these are unfortunately not readily available. One may, however, serve as a good example. In 1878 the granite body of the Church of St. Peter's, Laverton, was demolished,

whilst the freestone tower stood intact, although the heat was sufficient to destroy the granite sills and jambs in the tower, and to melt the bells in it, the temperature being, say, about 850° C.

The effect of variations of diurnal temperature and of humidity are all too common an experience to be worthy of repetition, and are also fully discussed in Gwilt's *Encyclopedia of Architecture*, Hull's *Building Stones of the British Isles*, Malécot's *Matériaux de Construction*, and other works. Investigations of the contained water in stone are recorded in Daniell and Wheatstone's "Report of the Royal Commission respecting Stone to be "used in the Construction of the Houses of Parliament "1839," and sundry papers and reports by Stephenson, Ansted, Sterry Hunt, and others.

## Description of the Stones.

The stones tested were selected to be as representative as possible of the geological formation and geographical distribution of those more commonly used in construction in this country; in all, 24 classes of stone were experimented upon, of which six were sandstones, nine were limestones and calcareous freestones, six were marbles, and three were of igneous origin.

In the following brief description of these stones I have omitted all mention of their physical constants, grouping these in Table 1, so as to be more readily comparable with the other tables, and to avoid unduly lengthening the Paper.

The York stone is a moderately fine grained, pale yellow grit from the area round Leeds, a variety of the Millstone Grit, which belongs to the Upper Carboniferous series: in general it underlies the Coal Measures, and outcrops along the margins of the coalfields. It

varies in its nature over its large exposure, which extends through Yorkshire, Lancashire, and North Derbyshire, and is variously known according to its location, or the roughness of its constituent grains, as York stone, Rough rock, Bramley Fall stone, Darley Moor stone, Kinder Scout grit, Aqueduct grit, Haslingden flag, &c.; its great resistance to crushing and to weathering, causes it to be largely used as templates for bridge piers and foundation blocks, in tunnel and reservoir work, and, in the districts in which it occurs, it is not uncommonly used in the construction of houses, cottages, and factories. It is almost entirely composed of silicious grains embedded in a silicious cement. Its composition is indicated by the following analysis :—

| | | |
|---|---|---|
| Silica | $Si\ O_2$ | 96·4 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·3 |
| Carbonate of lime | $Ca\ CO_3$ | 0·4 |

Among other notable structures for which it is used are the Town Hall, Manchester, and St. George's Hall, Liverpool.

The Red Mansfield stone is a fine grained chocolate-red calcareous sandstone from the Nottingham area of the Permian formation, which is next in order of geological succession to the Carboniferous.

It is in great demand as a building stone, and is thought to be only a silicious variety of the more famous Magnesian Limestone, used in the construction of the Houses of Parliament, York Minster, and Beverley Minster. It has the following composition :—

| | | |
|---|---|---|
| Silica | $Si\ O_2$ | 49·4 |
| Carbonate of lime | $Ca\ CO_3$ | 26·5 |
| Carbonate of magnesia | $Mg\ CO_3$ | 16·1 |
| Oxide of iron and alumina | $(Fe\ Al)_2\ O_3$ | 3·2 |
| Water | $H_2\ O$ | 4·8 |

The Aspatria stone is a compact, finely grained, chocolate-red sandstone, belonging to the St. Bees sandstone, a lower member of the Bunter series of the Trias, the geological formation succeeding the Permian. On the Cumberland coast this sandstone is a compact rock, forming the stately cliffs of St. Bees Head; but inland it is a loose friable sand of no building value whatever, used for various purposes in Lancashire foundries.

The coast variety is almost entirely composed of silica, and was used in the construction of Penrith Church and Castle and the beautiful Cistercian Abbey of Furness, founded in 1127.

The Quartzite is a dense metamorphosed sandstone, belonging to the Permian formation, from the Breedon and Cloud Hill quarries at Ashby-de-la-Zouch. It is somewhat difficult to work, but is a splendid stone, having a high resistance to attrition and crushing. These quartzites result from the application of enormous earth pressure to sandstone, crushing the sand grains one into the other, so that they coalesce, and when subsequently fractured, break across the grains rather than along the original surfaces of separation between the grains.

The hard and soft Daresbury sandstones from Daresbury, Cheshire, are two varieties of the same strata, belonging to the Lower Keuper series of the Trias. The first-named is a fairly good compact stone, but the latter is a friable sandstone with but little cohesion. Both are coloured chocolate-red, and the sand grains are fine and rounded.

The Doulting stone is a fine brown and white sandy and sparry limestone, from Shepton Mallet, Somerset, belonging to the Inferior Oolite, a lower member of the Oolitic series. This stone is occasionally slightly oolitic, but in the specimens which I tested, there was no

evidence whatever of the structure. In general, it consists of a mass of small broken shells, intermixed with a small amount of sand, and the whole loosely cemented together with a calcareous cement. It is a fairly durable stone under normal atmospheric conditions, and was used in the construction of Glastonbury and Bath Abbeys in the 11th century, and of Wells Cathedral in the 12th century, all of which are well preserved. It has the following chemical composition :—

| | | |
|---|---|---|
| Carbonate of lime | $Ca\ CO_3$ | 95·9 |
| Silica | $Si\ O_2$ | 2·1 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·6 |
| Carbonate of magnesia | $Mg\ CO_3$ | 0·1 |

The Portland base bed is a white shelly limestone, forming one of the lower beds of the Portland stone series, which, like the Monks Park, Boxground, Bradford, and Bath stones, belong to the Great Oolite formation, which represents the upper series of Oolitic strata.

The following tabular statement, in descending order, of a typical section indicates the relative positions of the several Portland stones, and from it one sees that the two most commonly used beds " base " and " whit " are the first two well defined limestones of this series.

| | Thickness. ft. | ins. | Depth. ft. | ins. |
|---|---|---|---|---|
| Soil, clays and earthy limestone . | 18 | 0 | 18 | 0 |
| Top cap, with 4 inches dirt bed beneath . . . . . | 9 | 4 | 27 | 4 |
| Skull cap, compact limestone . | 2 | 6 | 29 | 10 |
| Roach, oolitic shelly limestone . | 3 | 6 | 33 | 4 |
| Whit bed, cherty bed . . . | 8 | 6 | 41 | 10 |
| Base bed . . . . . | 8 | 6 | 50 | 4 |
| False bedded limestone with chert bands . . . . . | 40 | 9 | 91 | 1 |
| Portland sand . . . . | 80 | 0 | 171 | 1 |

The Portland stone quarries first attracted attention in 1625; since then, and especially in the reign of Queen Anne, the stone has had a considerable vogue, and the west front of St. Paul's Cathedral, the Horse-guards, Somerset House, and numerous London churches have been built of stone from these quarries. Its texture being somewhat uneven, its use is limited to massive structures such as columns, fonts, &c. It has the following composition:—

| | | |
|---|---|---|
| Carbonate of lime | $CaCO_3$ | 95·2 |
| „ „ magnesia | $Mg\ CO_3$ | 1·2 |
| Silica | $Si\ O_2$ | 1·2 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 0·5 |

The Monks Park stone is a compact close-grained stone from the district around Bath. It is a strong stone, carries a sharp arris, and is effective in appearance; it weathers admirably in sea coast and manufacturing towns, and is also greatly used for internal ornamental work, such as pulpits and fonts. It has the following composition:—

| | | |
|---|---|---|
| Carbonate of lime | $Ca\ CO_3$ | 97·2 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·6 |
| Silica | $Si\ O_2$ | 1·0 |
| Carbonate of magnesia | $Mg\ CO_3$ | 0·2 |

This stone was used in the construction of the Grosvenor Hotel, London, which has weathered well.

The Boxground, a fine, even textured, granular, cream-coloured Oolite, from the same district as the preceding, also weathers well and is not infrequently used in damp situations, near the ground line, and for plinths, sills, cornices, and copings. It was used in the construction of Longleat, Bowood, and

other Wiltshire county seats. It has the following composition :—

| | | |
|---|---|---|
| Carbonate of lime | $Ca\ CO_3$ | 94·5 |
| Carbonate of magnesia | $Mg\ CO_3$ | 2·5 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·2 |

The Bradford oolite is a moderately fine grained cream-coloured stone from quarries in the Bradford-on-Avon district. It is used for carved and moulded work, especially that of interiors. It has the following composition :—

| | | |
|---|---|---|
| Carbonate of lime | $Ca\ CO_3$ | 95·5 |
| Carbonate of magnesia | $Mg\ CO_3$ | 2·5 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·2 |

The Bath weatherstone is a soft cream-coloured Oolitic limestone, which is easy to work, and which weathers fairly well, seeing that it was used in the construction of 11th and 12th century edifices which are still in good preservation ; much of it is chiefly composed of small fragments of broken shells. It has been used in the construction of the Guildhall, Exchange, and several other important Bristol buildings. It has the following composition :—

| | | |
|---|---|---|
| Carbonate of lime | $Ca\ CO_3$ | 94·5 |
| Carbonate of magnesia | $Mg\ CO_3$ | 2·5 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·2 |

The Hopton Wood stone is a compact, fine grained, Carboniferous limestone, with a highly crystalline fracture, from Wirksworth, Derbyshire. It consists for the most part of amorphous, calcium carbonate with numerous encrinital fragments, in calcite, embedded in it. It takes a high polish and weathers well, and is used for steps, pavements, &c.

The two Chalks which were from the two Upper Chalk exposures at Micheldever and Mottisfont, Hamp-

shire, were included in the series, not because they had any value whatever as building material, but because I happened to be doing some other work with them at the time, and wished to determine the effect of moisture and heat on their strength.

The Carrara marble is a fine grained, white, saccharoidal marble from North Italy, which takes a soft, waxy, polish. Professor Pilla, by tracing out the various gradations in the Tecchia Valley, has shown that it is a metamorphosed dark grey Jurassic limestone. It has the following composition :—

| | | |
|---|---|---|
| Carbonate of lime | $Ca\ CO_3$ | 98·5 |
| Oxides of iron and alumina | $(Fe\ Al)_2\ O_3$ | 1·1 |
| Carbonate of magnesia | $Mg\ CO_3$ | 0·3 |

The other five varieties are all Belgian marbles, which were chosen because they are similar in all respects to those of the same name derived from British quarries, and also because they are frequently supplied and used in this country as British marbles.

At a later date I hope to be able to present information, similar to that embodied in this Paper, upon the Carboniferous crinoidal marbles of Derbyshire, the Devonian coral marbles of Devonshire, the Liassic mud marbles of Middle England, the serpentines of Canada, the Irish marbles, and other ornamental British stones.

The Rouge Royal is a dull red marble, variously spotted, flecked, and veined with white and grey, from Cerfontaine in the Province of Namur. It is not so brilliant in colour as the griotte of the Barousse Valley and other French localities, but it takes a good polish. According to Delesse it belongs to the Carboniferous and Devonian formations, and according to Dewalqué it belongs to the Frasné horizon of the Famennien system.

The other four varieties, St. Anne's, Dove, and Black

marbles, and the so called Belgian granite are all Carboniferous limestones, "calcaire carbonifère, système "carbonifère." The Black and the St. Anne's marbles also occur in the Devonian. The St. Anne's is a deep blue-black marble with short interrupted veins of white from Biesme, Province of Namur. It polishes well and has a good appearance. The Dove is a pale bluish white, almost saccharoidal marble from Couillet, Province of Hainaut, which polishes moderately well.

The Black is a hard, compact, deep black marble from Dinant, Province of Namur, which is difficult to work, but which polishes well, and is very strong and of uniform texture.

The so-called "petit granit" or Belgian granite, really a crinoidal marble, is a dense black carbonate of lime, spotted with debris of small shells, corals, and crinoids, from Soignies. It is quarried, shaped, and polished with ease, offers great resistance to crushing, and resists the action of frost and rain very well. Owing to its low price it has a large market.

The Red granite from Peterhead consists of large crystals of red orthoclase felspar, and small crystals of mica, embedded in a cementing material of quartz. It has the following composition:—

| | | |
|---|---|---|
| Silica | $Si\ O_2$ | 72·0 |
| Alumina | $Al_2\ O_3$ | 16·0 |
| Potash | $K_2\ O$ | 6·0 |
| Soda | $Na_2\ O$ | 2·5 |
| Lime | $Ca\ O$ | 1·5 |
| Iron oxide | $Fe_2\ O_3$ | 1·5 |
| Magnesia | $Mg\ O$ | 0·5 |

The Grey granite from Aberdeen consists of moderate sized crystals of grey orthoclase felspar, an abundance

of black mica, and some quartz as a cementing material, and has the following composition :—

| | | |
|---|---|---|
| Silica | $Si\ O_2$ | 59·7 |
| Alumina | $Al_2\ O_3$ | 18·8 |
| Soda | $Na_2\ O$ | 6·3 |
| Potash | $K_2\ O$ | 5·9 |
| Oxides of iron | $FeO, Fe_2O_3, Fe_3O_4$, | 4·8 |
| Lime | $Ca\ O$ | 1·3 |
| Magnesia | $Mg\ O$ | 0·7 |

The last variety of stone, from Brora, seems to consist for the most part of large crystals of dark-green hornblende. It is somewhat brittle and fractures irregularly. From casual inspection with a pocket lens, but in the absence of the more definite information derived from the microscopic examination of a thin section, I have classed it as a Diabase.

## Description of Apparatus and Methods of making the Tests.

All the test pieces were dressed to strips $6'' \times 1'' \times 1''$, excepting the marbles, which were $6'' \times \frac{7}{8}'' \times \frac{3}{4}''$, the red granites $6'' \times 1'' \times \frac{3}{4}''$, and the quartzites $6'' \times 1\frac{1}{4}'' \times 1\frac{1}{4}''$. It was my original intention to have had all the test pieces of an uniform size, but as these could not be conveniently obtained, I used the nearest size available. The marbles and granites were also polished upon one face.

All the test pieces were carefully inspected to insure that they were free from flaw or crack, and carefully measured with a micrometer vernier calliper gauge, reading to 0·1 millimetres (=·004″) the length being measured along the four edges, and the breadth and depth determined twice at each end and also at the

middle. The mean of these determinations was used in evaluating the strength, so that the variation does not effect the ultimate strength. At the commencement and end of each determination, the specimens were weighed, care being taken that those which had been raised in temperature were quite cool before weighing. Each record in the tables of results is the mean of a series of 4, 6, or more independent experiments.

The stones classed " dry " in the tables were placed in a steam oven, maintained at a temperature varying from 95° C. to 98° C., according to the atmospheric conditions, and kept in the oven until there was no appreciable decrease of weight when cooled to atmospheric temperature. Some specimens required only 3 or 4 hours in the steam oven, others from 20 to 30 hours, before they were thoroughly dried.

Those classed as " soaked " were placed on a light grid, in a large tank, with about a foot of water above them, and weighed from time to time, till there was no appreciable increase of weight, care being taken to lightly wipe the adherent water from each specimen with cotton waste or a clean handkerchief previous to weighing, so that the increased weight was solely that due to the weight of the absorbed water.

For the two remaining series of strength tests, the stones were inserted in the furnace and maintained there for 2, 6, 12, 18, or 24 hours, each specimen being removed at the end of each 6-hour period with a pair of light flat iron tongs, which grasped it along its entire length, and set to cool on a flat smooth surface of York stone, when it was styled " air cooled " ; or else it was placed immediately on removal from the furnace, and whilst still in the tongs, on a light smooth grid, in a basin filled with water, at a temperature varying from

8° C. to 16° C., according to the season and to the number of hours of exposure of the water in my laboratory; wherein it remained for 3 or four hours until broken in the strength tests. This was styled "water cooled."

In Table 3 there is a fifth class styled "in normal "condition"; this is stone tested just as delivered from the mason's yard, without any previous treatment, but, as it had been stored in drawers in my laboratory for some weeks previous to testing, it approximated to the "dry" rather than to the "soaked" condition.

Specimens from all classes were tested in cross-breaking and compression, except when the stone disintegrated in the furnace, or during cooling, when the record is marked "n.r.," as in the Tables 2, 3, 4, and 5.

For the cross-breaking experiments, the test piece rested on 2 thin pieces of rubber sheeting, laid upon 2 rigid steel knife edges exactly 4 inches apart; the test piece carried at its centre a steel saddle $\frac{3}{8}$ inch wide, rounded on the underside with a curve of large radius and terminating below in a hook, carrying a scale pan on which the load was placed in increments of 5 pounds at a time.

The stress is calculated as that for a beam 4 inches long supported at the ends and loaded with a central concentrated load of W lbs.; where W is equal to the weight of the saddle, scale pan, and added weights at the time of rupture, so that F in pounds per square inch $= \frac{6\ Wl}{4\ bd^2} = \frac{6\ W}{bd^2}$ where F is the stress at rupture, l is the unsupported span and b and d the mean breadth and depth of the test piece. As a further check all the broken 3-inch pieces were, when possible, broken on a 2-inch span, and F calculated from the formula

$F = \frac{3\,W}{bd^2}$ and checked with the values previously obtained for the 6-inch pieces.

In the compresssion tests, the test pieces were dressed from normal, and where possible from furnace, samples of known record, to cubes of 1-inch side, and finished with smooth faces, the greatest variation in the ratio of length of side of base to height of the block ranging from 0·9 to 1·1, therefore all the results are directly comparable. These blocks were placed between two sheets of lead, $3'' \times 3'' \times \frac{1}{8}''$ to equalise the pressure, and crushed between the plates of an Olsen hand-fed triple-lever testing machine, with a magnification of 1,000, the scale arm recording every 4 pounds from 0 to 500 pounds, and the scale pan load at the end of the recording lever being increased by constant increments of 500 pounds; the stress recorded being that at which they first showed signs of failure by cracking. The general design of the electric furnace in which the specimens were heated for the strength tests consisted of a rectangular metal skeleton framework, round which was placed sheets of mica, forming a box, closed at one end with asbestos mill board, but open at the other. Over the mica sides of the box a coil of chemically pure platinum wire was wound, forming part of an electrical circuit. The wire was covered with other sheets of mica, and the whole enwrapped in many thicknesses of asbestos cloth, and mounted on a stand carrying terminals. From 4 to 9 ampéres at 200 volts were sent through this circuit, and temperatures varying from 500° C. to 820° C. were obtained; the temperature for any set of experiments being maintained constant throughout that set. When the furnace had been raised to a required temperature, the stone to be tested was inserted in the furnace, a

piece at a time, the furnace being 1 inch longer than the testpiece. The current was measured with an Evershed and Vignole's ammeter, reading from 0 to 10 ampéres, subdivided to read to 0·1 ampéres. The voltage was measured with a Kelvin multi-cellular voltmeter, and the temperature by a Callendar-Griffiths platinum thermometer, connected up with a Callendar-Griffiths self-testing bridge and an Ayrton-Mather D'Arsonval galvanometer.

The thermometer was kept continuously in the furnace but at hourly or more frequent intervals the bridge circuit was made by a key, and the time, ampéres, volts, and resistance were read and recorded, and the temperature obtained from a specially prepared diagram, plotted from fixed temperatures carefully determined at the commencement of the experiments, and checked occasionally from time to time.

In the expansion experiments the furnace and its recording instruments were similar, except that the furnace was vertical and not so capacious as the horizontal type previously described, and for the lower temperatures ordinary mercurial thermometers were used instead of the electrical type. The thermal expansion was measured by means of an apparatus specially designed for this research by Mr. Griffith, consisting of a long balanced aluminium lever, of rolled joist section, with the fulcrum resting on a plate glass platform, and a projecting set screw resting on the stone test-piece. Any expansion of the stone caused the end of this lever to move upwards, and its motion was read by means of a cathetometer microscope.

Each stone was placed in the electrical furnace, and its temperature regulated and maintained constant throughout the experiment, which usually lasted from

3 to 4 hours. It was then allowed to cool, and the permanent swelling observed after 12 hours' cooling.

## Discussion of Observed Data.

### A. *Structure and Appearance.*

Considering first those experiments for the determination of the strength of the stone, there were several phenomena worthy of recording. Many of the Doulting, Portland, and Bradford test-pieces emitted a peculiar crackling noise during the first five minutes after insertion in and removal from the furnace; the York stone changed in colour from a straw yellow to a terra-cotta red, due possibly to a chemical change in the composition of the iron oxide in the cementing material of the grains of the stone. The Diabase changed from a dark greenish black to a dirty yellowish green: the Monks Park, Portland, Hopton Wood, and Boxground stones became chalky in appearance and somewhat lighter in colour; the Hopton Wood stone became internally mauve-grey in colour, and developed brown stains here and there; the Bradford and Bath oolites lost their fresh crisp appearance, became more or less earthy, and developed irregular red stains round some of the larger grains.

The Aspatria test-pieces, soon after their insertion in the furnace, gave off a dense smoky cloud, which soon after flashed and burnt steadily, with a smoky yellow flame for about a minute. By trituration of some of the crushed stone with alcohol and subsequent distillation of the alcohol, a viscous amber-coloured combustible oil was collected.

Several stones, such as Doulting, disintegrated in the furnace or immediately after removal therefrom.

Others such as Doulting or Daresbury disintegrated immediately on immersion in or removal from the water; and one Daresbury retained its form during cooling, and carried its own weight upon the supports, but broke when the stirrup, weighing only two pounds, was carefully placed upon it, and fell as a mass of incoherent sand to the floor.

Some, such as Doulting, Carrara marble, the Red and, in a less degree, the Grey granite, the Bradford and Bath oolites, and the Daresbury sandstone, had but little cohesion, and crumbled to powder when touched, or when more or less coarsely rubbed with the hand.

Several Carrara marbles warped upon cooling, arching slightly; others, such as Hopton Wood, Monks Park, and Boxground stones, retained a sharp arris but the sides caved in, and cracks more or less deep developed at right angles to the direction of greatest length of the test piece.

### B. *Strength.*

The results of the strength tests are given in Tables 2, 3, 4, and 5.

It may here be remarked that all the bars tested transversely failed, as one would expect, in tension, *i.e.* broke on the under surface immediately after developing cracks running from the underside upwards.

If one considers a rock mass as an aggregation of similar or dissimilar interlocking grains or crystals, then, when this mass is subjected to a high temperature, each of these grains expands or tends to expand with varying amount in different directions, as shown for a few crystals in Table 13 B.

To permit of this individual expansion of the grains or crystals, each and all will move outward; but upon

subsequent cooling they will not move back to the positions they originally occupied, but each will contract along its own axes about its own individual mass centre, resulting in a less intimate interlocking of the crystals or grains and a consequent diminution of the strength of the mass as a whole. If, on the other hand, the temperature be suddenly reduced through a considerable range, as when cold water is brought into contact with the heated stone, then the molecular stresses set up by this sudden change of temperature, coupled with the disruptive tendency of the heated and expanding water which has obtained access to the innermost pores, tends to a further reduction of its strength.

A study of Tables 2 and 3 fully confirms these assumptions, the strength of the stone in some cases being insufficient to maintain its own outward form, or so slight as to carry no load of even moderate magnitude; whilst in other cases the original strength is materially reduced when heated and slowly cooled in air; and still further depreciated, with exceptions hereafter noted, when suddenly cooled in cold water. If Tables 4 and 5 be also studied, it will be observed that there is a still greater diminution of strength with increase of the temperature, or of the period of exposure to the same high temperature. This question of diminution of strength is not at all one of heat decomposition of the calcareous constituents of the stone, as care was taken in the preparation of Tables 2 and 3 that no temperature should approximate within 100° C. to that temperature (810° C.) at which calcium carbonate dissociates into lime and carbonic acid gas.

The strength of a stone, varying with the dimensions of the test-piece and with the relative positions of the natural bed and the planes of stress, as shown in the

abstracts from Gillmore's and other researches is recorded in Tables 11, B and C. Care was taken that all the test pieces of the same stone were of similar dimensions, so as to be readily comparable, and that all were tested when resting upon their natural bed.

The ratios have been calculated, as shown in Tables 2 and 3, to the third place of decimals, but, as stones in the same geological formation may vary in structure and chemical composition from point to point, and from district to district, similar experiments might produce results differing in the second or third place of decimals. I am, however, of opinion that the figures in the first place of decimals can be accepted almost without reserve, and used as a basis of calculation if, at the same time, the area of the particular quarry from which the stone is obtained is carefully studied in the field by an expert geologist.

Considering Tables 2 and 3 as a whole, it is evident that there can be no class grouping into sandstones, limestones, &c., of the fire resistance of stones, such as Dr. Cutting presumes in his classification in *The Weekly Underwriter*, to which I have previously referred.

Taking the several items in detail, and taking the resistance to crushing and transverse loads when dry, in tons per square foot to the nearest ten tons, as the standard of comparison, one sees that York stone, which has a crushing strength of 550 tons per square foot, and a transverse strength of 70 tons a square foot, or a strength only $\frac{1}{8}$th of that in compression, deteriorates after subjection to high temperature. Thus its resistance to crushing is only 36 per cent. of its original crushing strength when slowly cooled in air, or 40 per cent. when suddenly cooled in water, whilst its transverse strength is only 65 per cent. and 27 per cent.

respectively, of its initial transverse strength when slow and fast cooled. If therefore a fairly high factor of safety has been chosen in the original design, a structure built of this stone may yet be serviceable, with certain safeguards, after a serious conflagration.

The Red Mansfield stone has a crushing strength of 160 tons per square foot and a transverse strength of 40 tons, or a transverse strength only $\frac{1}{4}$ of that in compression; its crushing strength after subjection to a high temperature and the two modes of cooling is 100 per cent. and 87 per cent. respectively, whilst in cross-breaking the strengths for the corresponding conditions of cooling are 62 per cent. and 60 per cent., so that, although the deterioration in resistance to cross-breaking is material, it is not of such magnitude as to seriously impair the utility of a well-designed edifice, still less is this the case in regard to compressive stresses.

The Aspatria stone is somewhat similar to the Red Mansfield stone, in that its resistance to crushing and transverse stresses is 160 and 30 tons respectively, a ratio of 5 to 1, and the post-conflagration cusrhing strengths are 100 per cent. and 99 per cent. respectively, but it differs from the Red Mansfield stone in that there is a more marked depreciation in its resistance to transverse stresses, to 20 per cent. and 15 per cent. respectively. If then this material has to withstand crushing stresses only, its deterioration may under ordinary circumstances be negligible, but its depreciation in transverse strength is so material as to necessitate grave consideration in the matter of its replacement.

The Quartzite, which has the moderately high crushing strength of 240 tons per square foot, and the phenomenally high transverse stress of 150 tons, over twice the transverse strength of the York stone and

five times that of the Aspatria stone, has a ratio of crushing to transverse stress of 8 to 5. It depreciates in compressive strength to 71 per cent. in both cases of slow and fast cooling from high temperature, and in transverse stress to 89 per cent. and 93 per cent. respectively. The comparatively moderate diminution of its strength in compression and cross-breaking makes it a valuable stone, and as it is possessed of a good colour and appearance (especially when polished) it should command an extensive market, not only for building purposes but also as road metal, for which its hardness and the cleanliness of its surface especially commend it.

The soft Daresbury sandstone, with but little natural cementing material, has the comparatively low crushing and transverse strengths of 60 tons and 10 tons per square foot respectively, a ratio of 6 to 1; its resistance to crushing after both modes of cooling was practically nothing, as was likewise its resistance to transverse stresses when fast cooled; when slowly cooled, however, its resistance to transverse stresses was about 48 per cent. of its original strength. It is possible that some small, but purely academic, values could have been obtained for the depreciated crushing strengths, but it was not possible with my apparatus, since one is unable to apply the first 100 or 200 pounds with any reliable degree of accuracy. But as this soft stone is but rarely, if ever, used in building, it is not necessary to consider it further.

The hard Daresbury sandstone, being more coherent, offers a greater resistance to crushing and cross-breaking than the soft Daresbury sandstone, the breaking stresses being 130 tons and 20 tons per square foot respectively, a ratio of 6 to 1; but after subjection to high tempera-

tures its resistance to crushing, when cooled in any manner, is so trivial as to be negligible; so also is its resistance to transverse stresses when fast cooled. When slow cooled, however, its transverse strength is 24 per cent. of the maximum, so that, although initially twice as strong as the soft Daresbury sandstone, its depreciation of strength is twice as great, and both break under practically the same load; or in other words, the heat has the effect of entirely breaking down the efficiency of the cementing material, on which its greater initial strength depended.

Turning now to the consideration of the calcareous freestones, one finds almost as varied a diversity of strengths as among the sandstones.

The Doulting stone, which has a crushing strength of 80 tons and a transverse strength of 20 tons per square foot, a ratio of 4 to 1, offers little or no resistance to crushing after subjection to high temperatures, for in most cases it fell into an incoherent mass of shelly fragments and sand, in the furnace or whilst cooling, or soon after placing on the table of the crushing machine. Under transverse loads its resistance fell to 2 per cent. and 7 per cent. respectively of its maximum strength, so that at a moderately high temperature it has no fire-resistance value whatever.

The Portland base bed stone, the strongest of all the calcareous stones which I tested, has a crushing strength of 260 tons and a transverse strength of 90 tons per square foot, a ratio of 3 to 1. This subsequently depreciates after subjection to high temperature to 60 per cent. and 51 per cent. in crushing strength, and to 66 per cent. and 14 per cent. in transverse strength respectively, when slow and fast cooled, so that one sees that the local action of the water in suddenly cooling the

stone materially depreciates its strength under both conditions of loading.

The Monks Park stone, with a compressive strength of 100 tons and a transverse strength of 40 tons per square foot, a ratio of 10 to 4, depreciates in compression to 82 per cent. and 74 per cent. respectively, and in transverse strength to 43 per cent. and 37 per cent., so that, in sustaining crushing loads, it might, within certain limits, be trusted after a conflagration to perform its office, but could not be trusted to sustain any severe transverse stresses.

The Boxground stone, with crushing and transverse strengths of 60 and 30 tons per square foot respectively, a ratio of 2 to 1, depreciates in compression to 49 per cent. and 54 per cent. of its original strength, when slow and fast cooled, and depreciates in transverse strength to 2 per cent. and 24 per cent. respectively; so that, while it might, with due precautions, serve again in compression, it could not be trusted to bear any transverse loads whatever.

The Bradford stone, with crushing and transverse strengths of 60 tons and 30 tons per square foot, a ratio of 2 to 1, deteriorates so that its strength, after subjection to high temperature, is 50 per cent. and 40 per cent. of its initial compressive strength, and 34 per cent. and 23 per cent. of its initial transverse strength.

The Bath stone, with slightly greater resistances to crushing and transverse stresses of 70 tons and 40 tons per square foot respectively, a ratio of 7 to 4, deteriorates similarly to 51 per cent. and 45 per cent. in compression, and to 35 per cent. and 26 per cent. in transverse loading. The depreciation in strength of both the two previous stones is so great as to render them untrustworthy after subjection to a severe conflagration.

The Hopton Wood stone, with crushing and transverse strengths of 190 tons and 60 tons per square foot respectively, a ratio of 3 to 1, depreciates in compression to 57 per cent. and 39 per cent. respectively, and when transversely loaded to 39 per cent. and 29 per cent.

The Chalks, with their low initial strengths of 20 tons and 10 tons per square foot respectively, had no residual strength whatever, after subjection to the high temperature, the expansion set up by the high temperature in all probability serving only to rupture the walls of the pores and break up the material.

The marbles also varied somewhat in the magnitude of the depreciation of their strengths.

The Carrara marble, with initial compressive and transverse strengths of 290 tons per square foot, and 50 tons per square foot, a ratio of 6 to 1, depreciates to 65 per cent. and 66 per cent., and to 19 per cent. and 9 per cent. of the respective strengths, when heated and cooled in the two prescribed modes.

The Rouge Royal marble with compressive and transverse strengths of 410 tons per square foot and 120 tons per square foot respectively, deteriorates to 55 per cent. of its initial compressive strength when cooled in either way, and to 33 per cent. and 24 per cent. of its transverse strength when slow and fast cooled.

The St. Anne's marble, with compressive and transverse strengths of 590 tons and 140 tons per square foot respectively, a ratio of 4 to 1, depreciates to 38 per cent. and 45 per cent. in compression, and to 34 per cent. and 27 per cent. in transverse strength. This stone is remarkable in that it depreciates in an almost identical ratio in both strengths when slowly cooled.

The Dove marble, with a compressive strength of 380 tons per square foot, and a transverse strength of

140 tons per square foot, a ratio of almost 3 to 1, depreciates in ratios somewhat similar to those for the Carrara marble; its compressive strength diminishing to 50 per cent. and 41 per cent. respectively, and its transverse strength to 8 per cent. and 15 per cent. according to the two modes of cooling.

The Black marble, with an initial resistance to crushing of 430 tons, and to transverse loads of 190 tons per square foot, a ratio of 2 to 1, depreciates in crushing strength to 61 per cent. and 70 per cent., and in transverse strength to 59 per cent. and 14 per cent. This marble and the Portland stone exhibit the most marked depreciation of resistance to transverse loads, when suddenly cooled from a high temperature, and to a lesser extent the Belgian granite displays similar qualities.

The Belgian granite, which has a considerable vogue owing to its uniformity of texture and its comparative cheapness, has a compressive strength of 350 tons per square foot, and a transverse strength of 130 tons per square foot, a ratio of about 3 to 1, depreciates to 59 per cent. and 69 per cent. in compression, and to 46 per cent. and 22 per cent. respectively when transversely loaded.

The three types of Plutonic rocks with which I experimented exhibited a greater diversity in the depreciation of their strengths than all the other classes of stone.

Thus the Red granite, with initial crushing and transverse strengths of 350 tons and 90 tons per square foot respectively, a ratio of 4 to 1, depreciates to 8 per cent. and 7 per cent. in crushing strength, and to 10 per cent. and 6 per cent. when transversely loaded; at once indicating the absolute inutility of granite as a fire-resisting

medium; comparable only in its utter depreciation with the poorer sandstones and calcareous freestones.

The Grey granite, with slightly higher initial crushing and transverse strengths of 380 tons and 170 tons per square foot respectively, a ratio of about 2 to 1, depreciates to 33 per cent. and 51 per cent. in crushing strength and to 11 per cent. and ½ per cent. in transverse strength, so that, this stone, although it greatly deteriorates, does not so utterly fail in compression as the Red granite; doubtless owing to the somewhat smaller and more uniform size of its component crystals, giving rise to less internal disturbance during expansion and contraction. It should be noted that, as with York stone, Box-ground, St. Anne's marble, Black marble and the Belgian granite, the crushing strength is slightly increased when suddenly cooled, compared with that when slowly cooled, doubtless because the sudden cooling at the surface gives rise to an intimately interlocked skin; but the Grey granite fails more absolutely under transverse loads than does the Red granite, owing to its smaller sized grains.

Finally the Diabase, with compressive and transverse strengths of 390 tons and 120 tons per square foot respectively, a ratio of 3 to 1, depreciates to 86 per cent. and 50 per cent. of its initial crushing strength, and to 24 per cent. and 5 per cent. of its initial transverse strength when slow and fast cooled, so that it might, within limits be trusted in compression after subjection to the high temperature of a conflagration, but could not be at all trusted under transverse loads.

From a general consideration of Tables 4 and 5, one sees that the effects detailed at length in the preceding paragraphs are more marked if the period of exposure be prolonged, or if the temperature be materially increased; thus York stone exposed for 2 hours to a temperature

of 618° C. had a residual strength of 43 per cent. which, after 6 hours at a temperature of 696° C. diminished to 35 per cent., and after 12 hours at a temperature of 728° C. diminished to 28 per cent. So also Red Mansfield stone, after subjection for similar periods to similar temperatures, had residual strengths of 58 per cent., 49 per cent., and 33 per cent. respectively.

Before leaving the question of strength, I would point out that, excepting for the relatively non-absorbent marbles, granites and quartzites, and the more absorbent Hopton Wood stone, the transverse strength of a stone when thoroughly dry is materially greater than that for the same stone when its pores are thoroughly charged with water; whilst the same general rule holds for the crushing strength, if to the list of those already enumerated be added the York, Red Mansfield and Aspatria sandstones, and the Doulting stone, but as this has been more fully treated in one of my other Papers it need not be further discussed here. So that a fire in a moderately old building would be productive of more havock to the structure than in a new one, as the stone would not have the high initial strength of my test-pieces, but would be depreciated to an extent depending on its relative exposure to diurnal and seasonal variations of temperature, the composition and destructiveness of the atmospheric impurity, the relative porosity of the stone, the inequality of its texture, and the incidence of wind, rainfall, and frost, the decrease of strength from the latter cause being indicated by the extracts from Marston's experiments tabulated in Table 12.

### c. *Expansion.*

From a study of Tables 6 and 7, for all the experimental work in obtaining which I am indebted, as I

previously mentioned, to my friend Mr. Griffith, one finds that the sandstones, as a class, have the greatest co-efficients of expansion in the first range of temperature from 20° C. to 100° C., the co-efficients varying from 9 millionths for Aspatria stone, to 16 millionths for the Quartzite; in the higher or second range of temperature from 100° C. to 200° C., there is an increase of the co-efficient to 1·5 times that at the lower range in the case of the Red Mansfield as the greatest rate of increase, and 1·1 times that at the lower range for the Hard Daresbury as the least variable. In the highest or third range of temperature from 200° C. to 300° C., there is a greater variation in the rate of change of the co-efficient than in the two previous ranges, the co-efficient for the Red Mansfield being 1·9 times that in the first range, whilst that for the Aspatria and the Quartzite remain practically constant at the value for the second range.

In general, the sandstones exhibit least variation in their rate of change at the higher temperatures, but the initial mean co-efficient of expansion in the lowest range is so high that the uniformity is more apparent than real.

The Oolites exhibit a most marked diversity at all temperatures, the Doulting stone having the greatest co-efficients of expansion in all three ranges, the values being 22·4, 26·2, and 26·7 millionths respectively, in the first, second, and third ranges.

The Bradford stone has the least co-efficient in the first range, the co-efficient being only 2·5 millionths, which is the least value in the co-efficient of all the stones upon which experiments were conducted, the Monks Park, Boxground, Bath and Portland stones having similarly low co-efficients of 3·5, 4·2, 4·8, and 4·9

millionths respectively. But with increase of temperature, the diversity is most marked, the co-efficient of expansion from 100° C. to 200° C., considered as a ratio of that at the lower range, varying from 1·2 for the Doulting stone to 4·0 for the Bradford stone, with values of 1·6, 2·3, 2·3, and 2·5 respectively for the Portland, Monks Park, Boxground, and Bath stones. In the still higher range from 200° C. to 300° C. the co-efficient remains practically the same for the Doulting stone, but increases to 5·4 times the co-efficient in the first range for the Bradford stone, with intermediate ratios of 2·9, 3·5, 3·8, and 4·6, respectively for the Portland, Bath, Monks Park, and Boxground stones.

If, instead of the ratios of the co-efficients in the several ranges, the co-efficients themselves be considered, the diversity is still more apparent; thus, from 20° C. to 100° C., the co-efficients have extreme values of 22·4, millionths, and 2·5 millionths for the Doulting and Bradford stones respectively, in the range from 100° C. to 200° C., the co-efficients for these two stones are 26·2 millionths, and 10·1 millionths, the former being the greatest co-efficient in this range, but the least co-efficient is now 7·8 millionths, that for the Portland stone. In the third range from 200° C. to 300° C., the Doulting stone has still the highest co-efficient, 26·7 millionths, the least being that of 13·4 millionths for the Monks Park stone, and the co-efficients for the Bradford and Portland stones being 13·5 millionths and 14·6 millionths respectively.

The Hopton Wood stone, by its expansion and also by its geological horizon, belongs more closely to the marbles than to the calcareous freestones, in which, from a desire to avoid too much classification, I have grouped it; but, in the question of expansion, I propose to con-

sider it with the marbles rather than with the calcareous freestones.

In the case of the marbles, the greatest co-efficient of expansion for the lowest range of temperature from 20° C. to 100° C. is 9·2 millionths for the Dove marble, and the least 4·4 millionths for the St. Anne's marble; in the next range from 100° C. to 200 C., the extreme ratios of the co-efficients to those in the lower range, are 3·7 for St. Anne's marble, and 1·8 for the Hopton Wood stone, and in the higher range from 200° C. to 300° C., the extreme ratios are similarly 4·1 and 2·1 times that of the lowest range, for the St. Anne's and Dove marbles respectively.

The igneous rocks in general possess co-efficients similar to those of the sandstones, the co-efficients being 10·2 millionths and 9·7 millionths respectively for the Red granite and the Diabase; but, with increase of temperature, there is a material increase in the rate of expansion, the Red granite having co-efficients of 17·0 millionths and 21·6 millionths in the higher ranges from 100° C. to 200° C., and from 200° C. to 300° C., the ratios being 1·0 to 1·7 and 2·1 respectively in the three ranges of temperature; whilst the Diabase has co-efficients of 15 millionths and 16 millionths at the two higher ranges, giving corresponding ratios of 1·0, 1·5, and 1·6 respectively in the three ranges.

From a general consideration of Table 6 as a whole, it will be seen that stones, which have almost identical co-efficients of expansion in one range of temperature, have widely varying co-efficients in another; thus for instance, Aspatria sandstone, Dove marble, Red granite, and Diabase, have co-efficients of 9·0, 9·2, 10·2, and 9·7 millionths respectively in the range from 20° C. to 100° C., differing from one another only in the ratios

of 100, 102, 113, and 108; in the next range, however, from 100° C. to 200° C., the co-efficients differ in the ratios of 100, 170, 149, and 132, and in the third range, from 200° C. to 300° C. they differ in the ratios of 100, 168, 188, and 139, respectively, so that, if two such stones are bonded together in a structure and subjected to any considerable range of temperature, the varying expansion at identical temperatures will not only give rise to severe molecular stresses within the material of the stone, but will also induce a disturbance in the distribution of the external stresses in the structure.

Furthermore, these four stones have co-efficients of expansion in the first range of temperature from 20° C. to 100° C. not greatly differing from those for iron, steel, &c. (see Table 14); but in the higher ranges of temperature there is a great diversity, so that, in a combination of, say, granite and steel, as in the modern skeleton steel framework structure with masonry exterior, most severe stresses must be set up during a fire by the variable expansion of the metal and stone alone, irrespective of the heat distortion of the unprotected ironwork, giving rise to a depreciation of the strength of the stone in addition to that produced by heat alone, which is detailed in Tables 2 and 3.

Again a dissimilar stone, such as, say, the granite forming the sills, &c., in the sandstone tower to which I referred at the commencement of the Paper, may, by its greater expansion, have to carry a greater load at high temperature than that for which it was originally designed, and this load may exceed its ultimate strength at that temperature. And from the quarrying experience of the ancients, previously quoted, one might presume that the disruptive effect of local cooling, as

when a hose plays with some pressure upon one face, is greater than when cooling is uniform and simultaneous over the whole surface, as in the experiments conducted to determine the values, headed "water cooled," in my Tables 2 and 3. From these considerations it will be at once apparent that, although the incorporation of dissimilar stones in the fabric of an edifice may, by their contrast in colour and texture, materially contribute to the artistic and architectural effects, such a miscellaneous assemblage is not to be recommended from a fire-resistance point of view. In a less degree this heterogeneity is not in the strictest sense advisable, bearing in mind that the diurnal and annual variations of temperature are not inconsiderable, even in these climes, as Table 16 well exemplifies.

Also, in designing for fire resistance, no masonry whatever should be carried on the upper boom of a plate girder, for, not only are the molecular stresses set up by the variable expansion of metal and stone injurious, but the increased deflection of the beam, under increase of temperature, induces a settlement of the masonry above it and brings additional lateral stresses upon the masonry.

This deflection, $D = \frac{WL^3}{NEI}$

Where W is the load on the beam,
L is the span of the beam,
I is the moment of inertia of the section,
N is a numerical quantity varying with the type of beam and the incidence of the load,
E is Young's modulus of elasticity.

Since, from the formula, D varies inversely with E, which decreases in an irregular manner with increase of

temperature, according to Pisati's experiments; it follows that D must increase with temperature, and the beam fails to support the load it was designed to carry at a time when it is most needed.

Also according to Petrin the tensile strength of iron at 300° C. is 90 per cent. of that at normal temperature, which is still further diminished to 70 per cent. at 500° C. and to 20 per cent. at 700° C., so that at high temperatures the utility of iron either as a tie or a beam is but small, and thus greater stresses may be brought on the masonry it was designed to assist at the very instant when that assistance is most essential to the continued stability of the structure.

In Table 7, the permanent linear alterations of the stones are set out in detail, elongations being prefixed by a positive sign and contractions by a negative sign. These latter may be due to a tendency to orientation of the constituent grains or crystals at high temperature, or to a fine dessication of the surface during the process of heating. In all cases the permanent deformation was determined by heating the block of stone in the vertical electric furnace for 3 hours, leaving it to cool in the furnace for 12 hours with the current shut off, air being freely admitted at the upper and lower ends of the furnace, and then measuring it.

Before leaving the question of strength, I would add that some of the stones had a greater percentage porosity after subjection to high temperatures (see Table 1) than they possessed in the normal condition, so that after a conflagration, besides the tendency to distortion of the structure induced by permanent swelling and the mere heat depreciation of the strength, the stones would take up a larger quantity of water in the dores, which would give rise to a more rapid deteriora-

tion by weathering, as well as a further depreciation of strength on account of the presence of the greater quantity of absorbed water.

## Fire Statistics.

I have made every effort to obtain information as to the approximate maximum recorded temperatures of conflagrations. These temperatures will of course vary within wide limits according to the local conditions, the trade, plan of the buildings, nature of the contents, &c., and the data are but very scant, for a fire captain's energies are, of necessity, concentrated on the work of extinction to the exclusion of all else, but much valuable information upon this point could be collected, as I indicated at the outset, after the extinction of the fire, by a careful inspection of all the metallic fittings of the interior of the building. There are numerous records of zinc and lead having been melted during the progress of conflagrations, or that temperatures of 415° C. and 326° C. were exceeded. I am particularly indebted to Mr. William Paterson, Chief Officer of the Glasgow Fire Brigade, who informed me that the slates of a timber shed in a saw mill fire at which he attended, melted like soft metal and had the appearance of lava; and also to Mr. J. G. Lewis, Chief Constable and Superintendent of the Fire Brigade, Blackburn, who informed me that the maximum temperature of a fire in his experience was about 600° C. I was therefore of opinion that in experimenting with stones exposed to temperatures ranging up to 800° C. for periods of from 2 to 18 hours. I was reproducing conditions as severe as those occurring in the more serious conflagrations.

Tables 8 and 9 were, by the kind permission of the

late Mr. A. R. Tozer, extracted from his very comprehensive and detailed annual reports of the operations of his brigade at Birmingham, and are splendid examples of what a compilation of fire statistics and records should be. If such records were available for every city and manufacturing town, and if a special abstract of serious fires in each town were prepared, showing value at risk, value of damage, origin, &c., as in Mr. Tozer's tables, there might in addition be added the total number of works or factories engaged in that locality in that industry, suffering the serious fire, together with data such as that indicated in Table 17. Then, not only would the collected abstract for the whole country give a most valuable indication of the relative fire risk of each trade or industry, but it would also supply an abundance of information for the guidance of the architect of the future in real fire-resistance design.

In Table 10, I have also given a few points upon which, I think, it is extremely desirable that more data should be available; for the relative immunity of a town from serious conflagrations is largely dependent on the ratio of the height of the higher buildings in the town to the maximum pressure on the mains, or to the greatest, pressure which the engines can afford.

### General Conclusions.

Finally, I would briefly summarise the points of primary importance in determining the most efficient design for fire resistance:—

1. That the edifice should in no wise be flimsy.

2. That it should be constructed of stone possessing an uniform or fairly uniform co-efficient of expansion, and retaining a considerable strength after subjection to high temperatures.

3. That all combinations of different stones should be avoided as much as possible.

4. That combinations of stone and metal should be avoided, especially when the former rests directly upon the latter, even when the metal is entirely enshrouded in stone; for stone acts as a fairly good conductor of heat, as shown in Table 1.

5. That stair wells and lift wells should open as little as possible on to the main building, and should preferably be enclosed and glazed with wired glass from basement to roof.

6. That floor areas should not be unduly large nor corridors unduly long.

7. That old stone which has been previously subjected to the high temperature of a severe conflagration, or to the deteriorating agencies, embraced in the term "weathering," during a more or less lengthy period, has not so great a strength nor fire resistance as newly quarried and seasoned stone.

In conclusion, I would tender my thanks to all the gentlemen to whom I have referred in the Paper, and also to Messrs. A. T. Bullen and H. F. Farmer for much careful experimental work done under my immediate direction and supervision.

## APPENDIX.

*Tables.*

1. General description of stones used in the investigations.
2. Crushing stress of the stones under various conditions.
3. Transverse breaking stress of the stones under various conditions.
4. Effect of period of exposure to high temperature on the transverse breaking stress of stone.
5. Effect of increase of temperature on the transverse breaking stress of stone.
6. Co-efficients of expansion of stone for various ranges of temperature.
7. Permanent alteration of dimensions of stone after cooling from high temperature.
8. Abstract record of Birmingham fires according to originating cause.
9. Abstract record of fires in 1905 according to originating cause and trades.
10. Fire statistics collected from various sources.
11. Previous determinations of the strength of stone, wet and dry.
12. Previous determinations of effect of freezing on the strength of stone.
13. Previous determinations of the co-efficients of expansion of rock crystals and stone.
14. Co-efficients of expansion of sundry materials used in building.
15. Equivalent temperatures in degrees Cent. and Fahr
16. Variations of temperature as recorded at Marlborough.
17. Suggested form for collecting statistical information with regard to fires.

## TABLE 1.

*Table showing the Physical Properties of Stone used in the Experiments.*

| STONE. | Weight per cubic foot in lbs. | Specific Gravity. | | Percentage Volume of Pores. | | Specific Heat. | | Co-efficient of Conductivity. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Normal Condition. | After Furnace. | Normal Condition. | After Furnace. | Normal | Furn. | Normal. | Furn. |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| *Sandstones and Quartzites—* | | | | | | | | | |
| York ... ... | 135·1 | 2·162 | 2·208 | 11·99 | 15·73 | ·225 | ·268 | — | ·0155 |
| Red Mansfield ... | 136·2 | 2·179 | 2·153 | 14·98 | 17·87 | ·205 | — | ·0158 | — |
| Aspatria ... ... | 125·4 | 2·006 | 2·051 | 7·61 | 16·46 | ·272 | ·185 | ·0083 | ·0076 |
| Quartzite ... ... | 184·0 | 2·944 | 1·867 | 2·88 | 18·67 | — | - | — | -- |
| Soft Daresbury ... | 111·9 | 1·790 | 1·803 | 16·58 | nr. | - | — | — | - |
| Hard Daresbury ... | 115·7 | 1·852 | 1·869 | 17·75 | 17·30 | — | — | | - |
| *Limestones and Calcareous Freestones—* | | | | | | | | | |
| Doulting ... ... | 129·1 | 2·065 | 2·064 | 14·46 | 18·89 | — | -- | -- | - |
| Portland Base Bed | 136·2 | 2·180 | 2·131 | 12·80 | 15·82 | — | — | — | — |
| Monks Park ... | 125·8 | 2·013 | 2·038 | 20·51 | 23·22 | — | ·174 | — | ·0061 |
| Boxground ... | 119·2 | 1·907 | 1·873 | 22·33 | 21·56 | — | ·208 | — | ·0067 |
| Bradford Oolite ... | 109·9 | 1·758 | 1·854 | 22·24 | 27·82 | ·225 | -- | ·0086 | — |
| Bath Oolite ... | 120·4 | 1·926 | 1·814 | 17·81 | 24·18 | — | — | — | — |
| Hopton Wood ... | 141·4 | 2·263 | 2·207 | 8·36 | 11·32 | — | — | - | — |
| Micheldever Chalk | 96·6 | 1·545 | nr. | 46·79 | nr. | — | -- | -- | — |
| Mottisfont Chalk... | 100·7 | 1·611 | nr. | 45·86 | nr. | — | — | — | — |
| *Marbles—* | | | | | | | | | |
| Carrara ... ... | 146·2 | 2·340 | 2·423 | 0·78 | 2·84 | ·198 | | ·0089 | -- |
| Rouge Royal ... | 138·2 | 2·212 | 2·411 | 0·93 | 2·96 | ·237 | ·198 | ·0102 | — |
| St. Anne's... ... | 157·9 | 2·527 | 2 520 | 0·74 | 2·54 | ·263 | — | ·0127 | — |
| Dove ... ... | 156·9 | 2·510 | 2·481 | 0·87 | 2·72 | — | -- | — | — |
| Black ... ... | 158·9 | 2·542 | 2·432 | 0·73 | 2·57 | -- | — | — | -- |
| Belgian Granite ... | 174·3 | 3·109 | 2·423 | 1·06 | 0·53 | — | — | — | — |
| *Granites and Igneous Rocks –* | | | | | | | | | |
| Red Granite ... | 157·5 | 2·520 | 2·330 | 0·28 | 2·89 | — | - | - | -- |
| Grey Granite ... | 168·3 | 2·693 | 2·723 | 0·12 | 3·26 | ·224 | -- | ·0092 | -- |
| Diabase ... ... | 163·1 | 2·610 | 2·630 | 0·24 | 1·36 | - | — | — | -- |

NOTE.—The values for columns headed "Normal" are for Stone in natural condition.
The values for columns headed "Furnace" are for Stone after subjection to high temperature.
Compare Columns 6 to 9 with Columns 2 and 3, Table 14.

## TABLE 2.

*Table showing the Effect of Absorbed Water, High Temperature, and Mode of Cooling on the Compressive Strength of Stones.*

| STONE. | Crushing stress of the Stone dry in | | Crushing stress of the Stone under various conditions expressed as a ratio of the crushing stress of the thoroughly dried stone. | | | |
|---|---|---|---|---|---|---|
| | lbs. per square inch. | Tons per square foot. | Dried. | Soaked in water. | Heated in furnace and cooled in | |
| | | | | | Air. | Water. |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *Sandstones and Quartzites—* | | | | | | |
| York ... ... ... ... ... | 8,480 | 546·6 | 1·000 | ·977 | ·358 | ·402 |
| Red Mansfield ... ... ... | 2,520 | 162·1 | 1·000 | 1·007 | 1·009 | ·87[illegible] |
| Aspatria ... ... ... ... | 2,430 | 156·3 | 1·000 | 1·008 | 1·003 | ·692 |
| Quartzite ... ... ... ... | 3,680 | 236·6 | 1·000 | 1·005 | ·712 | ·713 |
| Soft Daresbury ... ... ... | 900 | 57·9 | 1·000 | ·445 | nr. | nr. |
| Hard Daresbury ... ... ... | 2,020 | 129·2 | 1·000 | ·866 | nr. | nr. |
| *Limestones and Calcareous Freestones—* | | | | | | |
| Doulting ... ... ... ... | 1,190 | 76·6 | 1·000 | ·992 | nr. | nr. |
| Portland Base Bed ... ... ... | 4,080 | 262·4 | 1·000 | ·725 | ·603 | ·59[illegible] |
| Monks Park ... ... ... | 1,570 | 101·0 | 1·000 | ·380 | ·822 | ·74[illegible] |
| Boxground... ... ... ... | 940 | 60·3 | 1·000 | ·171 | ·494 | ·54[illegible] |
| Bradford Oolite ... ... ... | 860 | 55·3 | 1·000 | ·691 | ·580 | ·49[illegible] |
| Bath Oolite ... ... ... | 1,140 | 73·3 | 1·000 | ·675 | ·512 | ·446 |
| Hopton Wood ... .. ... | 2,920 | 187·8 | 1·000 | 1·003 | ·572 | ·387 |
| Micheldever Chalk ... ... | 390 | 25·0 | 1·000 | ·310 | nr. | nr. |
| Mottisfont Chalk ... ... ... | 290 | 18·7 | 1·000 | ·366 | nr. | nr. |
| *Marbles—* | | | | | | |
| Carrara ... ... ... ... | 4,450 | 286·1 | 1·000 | 1·007 | ·647 | ·65[illegible] |
| Rouge Royal ... ... ... | 6,420 | 412·8 | 1·000 | ·701 | ·550 | ·55[illegible] |
| St. Anne's ... ... ... ... | 9,250 | 594·8 | 1·000 | ·921 | ·378 | ·44[illegible] |
| Dove ... ... ... ... | 5,940 | 381·9 | 1·000 | ·914 | ·505 | ·41[illegible] |
| Black ... ... ... ... | 6,710 | 431·5 | 1·000 | ·999 | ·614 | ·7[illegible] |
| Belgian Granite ... ... ... | 5,460 | 351·1 | 1·000 | 1·004 | ·593 | ·68[illegible] |
| *Granites and Igneous Rocks—* | | | | | | |
| Red Granite.. ... ... ... | 5,480 | 352·4 | 1·000 | ·931 | ·983 | ·98[illegible] |
| Grey Granite ... ... ... | 5,950 | 382·6 | 1·000 | 1·008 | ·331 | ·50[illegible] |
| Diabase ... ... ... ... | 6,070 | 390·3 | 1·000 | 1·004 | ·857 | ·49[illegible] |

NOTE.—In Tables Nos. 2, 3, 4, and 5 "nr." signifies that the specimen disintegrated whilst in the furnace or after removal therefrom.

## TABLE 3.

*Table showing the Effect of Absorbed Water, High Temperature, and Mode of Cooling on the Transverse Strength of Stones.*

| STONE. | Breaking stress of the Stone dry in | | Breaking stress of the Stone in various conditions expressed as a ratio of that for dry Stone. | | | | |
|---|---|---|---|---|---|---|---|
| | lbs. per square inch. | Tons per square foot. | Dried. | Soaked in water. | In normal condition. | Heated in furnace and cooled in | |
| | | | | | | Air. | Water. |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| *Sandstones and Quartzites—* | | | | | | | |
| York ... ... ... ... | 1,124 | 72·3 | 1·000 | ·696 | ·876 | ·646 | ·271 |
| Red Mansfield ... ... | 666 | 42·8 | 1·000 | ·754 | ·937 | ·625 | ·600 |
| Aspatria ... ... ... | 498 | 32·0 | 1·000 | ·526 | ·834 | ·199 | ·151 |
| Quartzite ... ... ... | 2,354 | 151·4 | 1·000 | ·986 | ·999 | ·889 | ·927 |
| Soft Daresbury ... ... | 126 | 8·1 | 1·000 | ·769 | ·906 | ·483 | nr. |
| Hard Daresbury ... ... | 282 | 18·1 | 1·000 | ·312 | ·919 | ·244 | nr |
| *Limestones and Calcareous Freestones—* | | | | | | | |
| Doulting ... ... ... | 320 | 20·6 | 1·000 | ·606 | ·708 | ·024 | ·056 |
| Portland Base Bed .. ... | 1,448 | 93·1 | 1·000 | ·708 | ·892 | ·665 | ·141 |
| Monks Park... ... ... | 630 | 40·5 | 1·000 | ·664 | ·723 | ·432 | ·375 |
| Boxground ... ... ... | 404 | 26·0 | 1·000 | ·695 | ·758 | ·025 | ·236 |
| Bradford Oolite ... .. | 401 | 25·8 | 1·000 | ·493 | ·886 | ·313 | ·234 |
| Bath Oolite ... ... ... | 609 | 39·2 | 1·000 | ·604 | ·996 | ·349 | ·261 |
| Hopton Wood ... ... | 1,003 | 64·5 | 1·000 | ·948 | ·992 | ·388 | ·289 |
| Micheldever Chalk... ... | 162 | 10·4 | 1·000 | ·551 | ·747 | nr. | nr. |
| Mottisfont Chalk ... ... | 215 | 13·8 | 1·000 | ·612 | ·938 | nr. | nr. |
| *Marbles—* | | | | | | | |
| Carrara ... ... ... | 823 | 52·9 | 1·000 | ·924 | ·826 | ·189 | ·086 |
| Rouge Royal ... ... | 1,933 | 124·3 | 1·000 | 1·008 | 1·007 | ·327 | ·236 |
| St. Anne's ... ... ... | 2,243 | 144·2 | 1·000 | ·954 | ·990 | ·342 | ·273 |
| Dove ... ... ... ... | 2,235 | 143·7 | 1·000 | ·800 | ·963 | ·077 | ·153 |
| Black ... ... ... | 2,955 | 190·0 | 1·000 | ·788 | ·886 | ·590 | ·140 |
| Belgian Granite ... ... | 2,108 | 135·5 | 1·000 | ·776 | 1·006 | ·456 | ·216 |
| *Granites and Igneous Rocks—* | | | | | | | |
| Red Granite... ... ... | 1,437 | 92·4 | 1·000 | 1·009 | ·997 | ·099 | ·060 |
| Grey Granite ... ... | 2,712 | 174·4 | 1·000 | ·938 | ·976 | ·112 | ·004 |
| Diabase ... ... ... | 1,820 | 117·0 | 1·000 | ·874 | ·748 | ·238 | ·056 |

## TABLE 4.

*Table showing the Effect of the Duration of Exposure to High Temperature on the Transverse Breaking Stress of Stone.*

| STONE. | Breaking Stresses, expressed as Percentage Ratios of breaking stress of the Stone. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Stress. | 18 hours' Exposure. | | 2 hours' Exposure. | | 6 hours' Exposure. | | 12 hours' Exposure. | |
| | Dry. | Tem.° C. | Stress. | Tem.° C. | Stress. | Tem.° C. | Stress. | Tem.° C. | Stress. |
| *Sandstones*— | | | | | | | | | |
| York Stone ... | 100·0 | 618 | 42·6 | 696 | 35·5 | 728 | 28·3 | — | — |
| Red Mansfield ... | 100·0 | 618 | 58·0 | 696 | 49·5 | 728 | 32·8 | — | — |
| Aspatria ... ... | 100·0 | 605 | 19·9 | 602 | 26·7 | 728 | nr. | 695 | nr. |
| Soft Daresbury ... | 100·0 | 776 | 54·7 | 695 | nr. | 695 | nr. | 695 | nr. |
| *Limestones and Calcareous Freestones*— | | | | | | | | | |
| Doulting ... .. | 100·0 | 629 | 2·4 | 602 | nr. | 702 | nr. | — | — |
| Portland ... ... | 100·0 | 686 | 71·2 | 796 | 14·1 | 702 | nr. | | |
| Monks Park ... | 100·0 | 543 | 43·2 | 665 | nr. | 702 | nr. | | |
| Boxground ... | 100·0 | 692 | 2·5 | 817 | nr. | 702 | nr. | | |
| Bradford Oolite ... | 100·0 | 683 | 41·6 | 722 | 17·8 | 702 | nr. | | |
| Bath Oolite ... | 100·0 | 605 | 35·3 | 618 | 24·8 | 702 | 19·7 | 635 | 14·9 |
| Hopton Wood ... | 100·0 | 576 | 38·8 | 817 | 38·6 | 702 | nr. | | |
| *Marble*— | | | | | | | | | |
| Dove ... ... | 100·0 | 576 | 9·8 | 575 | 7·7 | 696 | nr. | 767 | nr. |

## TABLE 5.

*Table showing the Effect of Increase of Temperature on the Transverse Breaking Stress of Stone.*

| STONE. | Duration of Tests. | Breaking Stress expressed as Percentage Ratios of Stress dry. | | | | |
|---|---|---|---|---|---|---|
| | | Stress dry. | Tem. ° C. | Stress. | Tem. ° C. | Stress. |
| *Calcareous Freestones*— | Hours. | | | | | |
| Bath Oolite ... ... | 6 | 100·0 | 515 | 28·2 | 678 | 15·3 |
| Bath Oolite ... ... | 12 | 100·0 | 607 | 40·0 | 716 | 19·0 |
| Bath Oolite ... .. | 18 | 100·0 | 603 | 25·6 | 673 | 19·1 |
| *Marbles*— | | | | | | |
| Carrara ... ... ... | 6 | 100·0 | 558 | 18·9 | 796 | 11·1 |
| Rouge Royal ... ... | 6 | 100·0 | 558 | 20·4 | 796 | 20·3 |
| St. Anne's ... ... | 6 | 100·0 | 575 | 44·6 | 796 | 34·1 |
| Belgian Granite ... | 6 | 100·0 | 575 | 21·4 | 817 | 21·5 |
| *Granites*— | | | | | | |
| Red Granite ... ... | 6 | 100·0 | 575 | 9·9 | 817 | 6·1 |
| Grey ,, ... ... | 6 | 100·0 | 632 | 11·2 | 723 | nr. |

## TABLE 6.

*Table showing the Co-efficients of Linear Expansion of Stones, or the Elongation per Degree Centigrade of 1 inch length of Stone in Inches when multiplied by* $10^6$.

| Stone. | Ranges of Temperature in Degrees Centigrade. | | | | |
|---|---|---|---|---|---|
| | From 20° C. to 100° C. | From 100° C. to 200° C. | | From 200° C. to 300° C. | |
| | Co-efficient | Co-efficient | Co-efficient expressed as a ratio of that from 20° C. to 100° C. considered as unity. | Co-efficient | Co-efficient expressed as a ratio of that from 20° C. to 100° C. considered as unity. |
| *Sandstones and Quartzites—* | | | | | |
| York ... ... ... | 12·340 | 16·200 | 1·3 | 18·780 | 1·5 |
| Red Mansfield ... ... | 9·926 | 15·410 | 1·5 | 19·020 | 1·9 |
| Aspatria ... ... ... | 9·016 | 11·400 | 1·3 | 11·480 | 1·3 |
| Quartzite ... ... ... | 16·200 | 19·900 | 1·2 | 19·900 | 1·2 |
| Hard Daresbury ... ... | 13·480 | 15·400 | 1·1 | 18·870 | 1·4 |
| *Limestones and Calcareous Freestones—* | | | | | |
| Doulting ... ... ... | 22·370 | 26·190 | 1·2 | 26·690 | 1·2 |
| Portland Base Bed ... | 4·944 | 7·782 | 1·6 | 14·600 | 2·9 |
| Monks Park ... ... | 3·536 | 8·233 | 2·3 | 13·420 | 3 8 |
| Boxground ... ... | 4·186 | 9·560 | 2·3 | 19·240 | 4·6 |
| Bradford Oolite ... ... | 2·513 | 10·140 | 4·0 | 13·510 | 5·4 |
| Bath Oolite ... ... | 4·840 | 12·270 | 2·5 | 16·980 | 3·5 |
| Hopton Wood ... ... | 8·640 | 15·620 | 1·8 | 20·770 | 2·4 |
| *Marbles—* | | | | | |
| Carrara ... ... ... | 8·758 | 17·510 | 2·0 | 24·340 | 2·8 |
| Rouge Royal ... ... | 5·759 | 13·140 | 2·3 | 15·250 | 2·6 |
| St. Anne's .. ... ... | 4·446 | 16·320 | 3·7 | 18·300 | 4·1 |
| Dove ... ... ... | 9·206 | 19·330 | 2·1 | 19·330 | 2·1 |
| Black ... ... ... | 4·914 | 10·520 | 2·1 | 13·650 | 2·8 |
| Belgian Granite ... ... | 5·231 | 16·230 | 3·1 | 19·550 | 3·7 |
| *Granites and Igneous Rocks—* | | | | | |
| Red Granite ... ... | 10·200 | 16·980 | 1·7 | 21·600 | 2·1 |
| Diabase ... ... ... | 9·660 | 15·030 | 1·5 | 15·940 | 1·6 |

## TABLE 7.

*Table showing the Permanent Elongation of Stones after cooling, or the Increased Length in Inches of a Bar of Stone originally* 100 *Inches long, after subjection to a Temperature of* 300° *C. for Three Hours and slow cooling in Air for Twelve Hours*

| Stone. | Permanent increase of length. |
|---|---|
| ***Sandstones and Quartzites—*** | |
| York ... ... ... ... ... | − 0·0092 |
| Red Mansfield ... ... ... ... | − 0·0014 |
| Aspatria ... ... ... ... ... | − 0·0123 |
| Quartzite ... ... ... ... ... | + 0·0360 |
| Hard Daresbury ... ... ... ... | − 0·0156 |
| *Limestones and Calcareous Freestones* | |
| Doulting ... ... ... ... ... | + 0·0150 |
| Portland Base Bed ... ... ... | − 0·0015 |
| Monks Park ... ... ... ... | − 0·0016 |
| Boxground ... ... ... ... | + 0·0397 |
| Bradford Oolite ... ... ... ... | + 0·0278 |
| Bath Oolite ... ... ... ... | + 0·0367 |
| Hopton Wood ... ... ... ... | + 0·0349 |
| *Marbles—* | |
| Carrara ... ... ... ... ... | + 0·1740 |
| Rouge Royal ... ... ... ... | + 0·0198 |
| St. Anne's ... ... ... ... ... | + 0·0250 |
| Dove ... ... ... ... ... | + 0·1290 |
| Black ... ... ... ... ... | + 0·0068 |
| Belgian Granite ... ... ... ... | + 0·0680 |
| *Granites and Igneous Rocks—* | |
| Red Granite ... ... ... ... | + 0·0488 |
| Diabase ... ... ... ... ... | + 0·0460 |

NOTE. + signifies a permanent elongation.
− signifies a permanent contraction.

## TABLE 8.

*Table showing the Origins of Fires attended by the Birmingham City Fire Brigade from* 1895 *to* 1905.

| Years. | Estimated Amount at Risk. | Estimated Amount of Damage. | ORIGIN. | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Boiling, Drawing off, or Working of Oils, Spirits, and Chemicals. | Lights thrown down, Sparks from Fire, Children playing with Fire and Lucifers. | Clothes taking Fire, Candles, Paraffin and Painters' Lamps, Airing Linen, Wax Tapers, and Smoking Tobacco. | Furnaces, Ovens, Muffles, Stoves, and Boilers. | Hot Ashes, Coke, Metal, and Soot. | Intoxication, Insanity, and Quarrelling. | Electricity and Electric Light Installation. | Friction of Machinery, &c. | Sparks from Chimneys, Locomotives, and Machinery. | Gas, Gas Explosions, Defective Gas Fittings, and Gas Stoves. | Spontaneous Ignition of Sheffield Lime, Sawdust, Lamp Black, Cotton Waste, Measuring Tapes, Oily Rags, Phosphorus, and Overheat of Hay. | Timber too near Flues, Fire Places, Heating Apparatus, Gas Engine Exhaust, and Hot-Water Pipes. | Boiler and Heating Apparatus Explosions. | Suspicious and Incendiary. | Lime Slacked by Rain, &c. | Concentration of Sun's Rays. | Explosion of Gunpowder and Fireworks. | Rats gnawing Matches. | Lightning. | Cinematograph Apparatus. | Fumigation and Stoving. | Explosion of Motor Car. | Unknown. | Total. | Damage Serious. | Damage Slight |
| | £ | £ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1895 | 1,538,202 | 60,290 | 16 | 82 | 104 | 22 | 23 | 6 | 2 | 2 | 10 | 39 | 9 | 118 | 7 | 4 | — | — | 1 | — | 2 | — | — | — | 44 | 491 | 33 | 458 |
| 1896 | 1,726,148 | 35,688 | 20 | 88 | 95 | 17 | 15 | 10 | — | — | 5 | 29 | 9 | 127 | — | 2 | — | 1 | — | — | — | — | — | — | 36 | 454 | 22 | 432 |
| 1897 | 1,809,999 | 37,976 | 18 | 123 | 118 | 27 | 19 | 6 | 1 | 2 | 5 | 50 | 21 | 113 | — | 6 | — | — | — | — | — | — | 1 | — | 44 | 554 | 33 | 521 |
| 1898 | 1,901,443 | 29,033 | 24 | 115 | 114 | 18 | 21 | 3 | 5 | 3 | 8 | 49 | 14 | 105 | — | 2 | — | — | — | — | — | — | 2 | — | 31 | 515 | 29 | 486 |
| 1899 | 2,118,915 | 77,872 | 20 | 144 | 96 | 19 | 31 | 8 | 4 | — | 6 | 40 | 10 | 110 | — | 3 | 1 | — | 1 | — | — | — | 1 | — | 35 | 529 | 41 | 488 |
| 1900 | 1,989,929 | 27,446 | 24 | 109 | 65 | 21 | 32 | 15 | 2 | 3 | 9 | 30 | 10 | 108 | 1 | 4 | — | — | — | 1 | — | — | 2 | — | 19 | 456 | 29 | 427 |
| 1901 | 2,161,171 | 39,319 | 29 | 124 | 80 | 26 | 30 | 5 | 8 | 2 | 10 | 36 | 17 | 112 | 1 | 4 | 2 | 1 | — | 1 | — | 1 | 1 | 1 | 27 | 518 | 32 | 486 |
| 1902 | 1,726,122 | 37,759 | 23 | 114 | 88 | 16 | 23 | 7 | 3 | 1 | 6 | 38 | 14 | 112 | — | 5 | — | — | — | — | — | — | 4 | — | 27 | 481 | 35 | 446 |
| 1903 | 2,352,847 | 60,978 | 17 | 104 | 80 | 24 | 32 | 4 | 7 | 4 | 18 | 40 | 13 | 97 | 1 | 8 | 1 | 2 | — | — | — | — | 1 | — | 22 | 475 | 27 | 448 |
| 1904 | 2,791,285 | 46,544 | 27 | 130 | 95 | 31 | 45 | 7 | 3 | 3 | 17 | 35 | 15 | 119 | — | 8 | 1 | 1 | — | — | — | — | — | — | 20 | 557 | 34 | 523 |
| 1905 | 3,068,822 | 56,287 | 25 | 164 | 90 | 19 | 51 | 6 | 1 | 4 | 8 | 45 | 22 | 137 | — | 7 | 1 | — | 2 | — | — | — | 1 | — | 31 | 614 | 22 | 592 |
| Total | 23,184,883 | 509,192 | 243 | 1,297 | 1,025 | 240 | 322 | 77 | 36 | 24 | 102 | 431 | 154 | 1,258 | 10 | 53 | 6 | 5 | 5 | 2 | 2 | 1 | 13 | 1 | 336 | 5,644 | 337 | 5,307 |
| Percentages of Total Number of Fires. | | | 4·3 | 23·1 | 18·2 | 4·3 | 5·7 | 1·4 | 0·6 | 0·4 | 1·8 | 7·6 | 2·7 | 22·3 | 0·2 | 0·9 | 0·1 | 0·1 | 0·1 | 0·04 | 0·04 | 0·02 | 0·2 | 0·02 | 6·0 | 100·0 | 5·97 | 94·03 |

# TABLE 9.

*Table showing the Origin of Fires attended by the Birmingham City Fire Brigade in* 1905, *classified according to Trades.*

| TRADES, &c. | ORIGIN. | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Boiling, drawing off or working of Oils, Spirits, and Chemicals. | Burning Rubbish. Lights thrown down, Sparks from Fire. Children playing with Fire, Lucifers and Fireworks. | Clothes taking fire. Candles, Paraffin and Painters' Lamps. Airing Linen, Wax Tapers, and Smoking Tobacco. | Furnaces, Ovens, Muffles, Stoves, and Boilers. | Hot Ashes, Metal, Coke, and Soot. | Intoxication, Insanity, and Quarrelling. | Electricity and Electric Light Installation. | Friction of Machinery. | Sparks from Chimneys, Locomotives and Machinery. | Gas, Gas Explosions, defective Gas Fittings, and Gas Stoves. | Spontaneous Ignition of Sheffield Lime, Sawdust, Lamp Black, Measuring Tapes, Cotton Waste, Oily Rags, Phosphorus, and Overheat of Hay. | Timber too near Flues, Fireplaces, Exhaust and Hot Water Pipes. | Suspicious and Incendiary. | Lime Slaked by Rain, &c. | Explosions of Gunpowder and Fireworks. | Fumigating and Stoving. | Unknown. | Total. | Serious Damage. |
| Ammunition and Firework Makers | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 2 | — | 2 | — |
| Bakers and Pastry Cooks ... ... | — | 2 | — | 1 | — | — | — | — | — | — | — | 2 | 1 | — | — | — | 6 | 1 |
| Bedstead Makers ... ... ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | 1 | 1 |
| Brass Founders and Workers ... | 3 | 5 | — | 2 | 2 | — | — | — | 1 | — | 4 | 2 | — | — | — | 3 | 22 | 1 |
| Brush and Bristle Makers ... | — | 1 | — | 2 | 1 | — | — | — | — | — | — | — | — | — | — | — | 4 | — |
| Builders ... ... ... ... | 1 | 1 | — | — | 2 | — | — | — | — | — | — | — | — | — | — | 1 | 5 | 1 |
| Cabinet, Picture Frame, and Looking Glass Makers ... ... | — | — | — | — | — | — | — | 1 | — | — | — | 1 | — | — | — | — | 2 | — |
| Carpenters and Workers in Wood | — | 3 | — | — | — | — | — | — | — | — | — | 1 | — | — | — | 2 | 6 | — |
| Chemical Works, and Chemists and Druggists ... ... ... ... | 4 | — | — | 1 | — | — | — | 1 | — | — | 1 | — | — | — | — | — | 7 | — |
| Churches and Chapels ... ... | — | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | 1 | — |
| Cycle Accessories, Cycle, and Motor Car Makers ... .. ... | 2 | 3 | — | 1 | 1 | — | — | — | — | 1 | 1 | 2 | 1 | — | — | — | 4 | 16 | 3 |
| Coal Merchants ... ... ... | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Drapers, Milliners, and Tailors ... | — | 1 | 1 | 1 | 1 | — | — | — | — | 3 | — | — | 1 | — | — | — | 3 | 11 | 1 |
| Edge Tool Makers ... .. ... | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | 1 | — |
| Electro Platers and Polishers ... | — | 5 | — | — | 3 | — | — | — | — | 1 | 2 | 2 | — | — | — | — | — | 13 | 1 |
| Engineers and Machinists ... ... | 2 | 3 | 1 | — | 1 | — | — | — | — | 1 | 1 | 1 | — | — | — | — | 2 | 12 | 1 |
| Farming Stock and Greenhouses ... | — | — | — | — | — | — | — | — | — | — | 1 | — | 1 | — | — | — | 2 | 5 | 2 |
| Flour Mills ... ... ... ... | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | 1 | — |
| Furniture Dealers and Upholsterers | — | 3 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 3 | — |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gun and Gun Implement Makers | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | 1 | — |
| Hay, Straw, and Corn Dealers ... | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | — | — | — | 1 | — |
| Hotels and Club Houses ... ... | — | — | — | — | 1 | — | — | — | — | — | — | 2 | — | — | — | — | — | 3 | — |
| India Rubber Works ... ... | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Iron Founders and Workers ... | 1 | 2 | — | — | 2 | — | — | — | — | 1 | — | 2 | — | — | — | — | 1 | 9 | 1 |
| Japanners and Enamellers ... | 2 | 1 | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | 4 | — |
| Jewellers (Manufacturing) and Silversmiths ... ... ... | 1 | 5 | — | — | 2 | — | — | — | — | 4 | — | 2 | — | — | — | — | — | 14 | — |
| Lamp Makers ... ... ... | — | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Laundries ... ... ... ... | — | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Leather Workers ... ... ... | — | 2 | — | 1 | 1 | — | — | — | — | — | — | — | — | — | — | — | — | 4 | — |
| Marine Store Dealers ... ... | — | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | 1 | 2 | — |
| Metal Rollers and Workers ... | — | 2 | — | 1 | 1 | — | — | — | — | 1 | 3 | 2 | — | — | — | — | 3 | 13 | 1 |
| Oil Stores and Dealers ... ... | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Oil, Varnish, and Colour Works ... | 1 | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | 1 | 3 | — |
| Painters, Plumbers, and Glaziers... | — | 1 | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | — | 2 | — |
| Paper, Paper Box, and Bag Makers | — | 1 | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | 2 | — |
| Pawnbrokers ... ... ... | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Printers and Stationers ... ... | — | 3 | — | — | — | — | 1 | — | — | — | 1 | 1 | — | — | — | — | 2 | 8 | — |
| Private ... ... ... ... | 4 | 77 | 79 | 2 | 9 | 5 | — | — | — | 17 | 1 | 85 | 1 | — | — | 1 | — | 281 | 1 |
| Public Buildings ... ... ... | — | — | 1 | 1 | — | — | — | — | — | — | — | 2 | — | — | — | — | — | 4 | — |
| Public Houses and Refreshment Rooms ... ... .. ... | — | 7 | 2 | 2 | 2 | — | — | — | — | 4 | — | 5 | — | — | — | — | 1 | 23 | — |
| Railways ... ... ... ... | — | — | — | — | — | — | — | — | 3 | — | 1 | — | — | — | — | — | — | 4 | 1 |
| Rope Works... ... ... ... | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | 1 |
| Sale Shops and Offices ... ... | 1 | 10 | 2 | 1 | 3 | — | — | — | — | 5 | — | 11 | — | — | — | — | 1 | 34 | 1 |
| Schools ... ... ... ... | — | — | — | 1 | 1 | — | — | — | — | 1 | — | 1 | — | — | — | — | 1 | 5 | 1 |
| Stables ... ... ... ... | — | 3 | 2 | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | 6 | 2 |
| Theatres and Music Halls... .. | 1 | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 2 | — |
| Timber Merchants and Saw Mills | — | — | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | 1 | — |
| Tin Plate Workers... ... ... | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| Tobacconists ... .. ... | — | 1 | — | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | 2 | — |
| Tube Works ... ... ... | 1 | — | 1 | — | 1 | — | — | 1 | — | — | — | 3 | — | 1 | — | — | — | 8 | — |
| Unoccupied, Unfinished, and Open Spaces ... ... ... ... | — | 12 | 1 | — | 13 | 1 | — | — | 4 | 2 | 2 | 5 | 1 | — | — | — | — | 41 | — |
| Warehouses... ... ... ... | — | 1 | — | — | — | — | — | — | — | 2 | — | — | — | — | — | — | — | 3 | — |
| Whipmakers ... ... ... | — | 1 | — | — | — | — | — | — | — | — | 1 | — | — | — | — | — | — | 2 | 1 |
| Wireworkers ... ... ... | — | — | — | 1 | — | — | — | — | — | — | — | — | — | — | — | — | — | 1 | — |
| TOTAL ... ... | 25 | 164 | 90 | 19 | 51 | 6 | 1 | 4 | 8 | 45 | 22 | 137 | 7 | 1 | 2 | 1 | 31 | 614 | 22 |
| TOTALS expressed as Percentages of the Grand Total ... ... | 4·1 | 26·7 | 14·7 | 3·1 | 8·3 | 0 | 0·2 | 0·6 | 1·3 | 7·3 | 3·6 | 22·3 | 1·1 | 0·2 | 0·3 | 0·2 | 5·0 | 100·0 | 3·6 |

## TABLE 10.

*Table showing—*

A. *Pressure on Mains and Heights of Buildings.*

| City or Town. | Pressure on mains in lbs. per square inch. | Greatest pressure induced by the fire engine in lbs. per square inch. | Height of buildings above street level in feet. | | Maximum observed temperature °C. |
|---|---|---|---|---|---|
| | | | Maximum. | Average.* | |
| Birmingham | 20 to 95 | 180 | 120 | 60 | |
| Blackburn... | 25 to 130 | 125 | 76 | 38 | 600 |
| Glasgow ... | 25 to 70 | 135 | 110† | 60 | |
| London ... | 25 to 80 | 160 | 110 | 30 | 1000 |

* Average height in manufacturing districts.

† Under the new building regulations this is limited to one-half more than the width of the street, *i.e.* $1\frac{1}{2} \times 60$ feet = 90 feet.

B. *The Available Pressure through 25 Yards of unlined Canvas Hose 2½ inches diameter.*

*(Experiment, Birmingham City Fire Brigade.)*

| Open nozzle. in inches. | Pressure in lbs. per square inch. | | |
|---|---|---|---|
| | On main. | At standpipe. | At branch. |
| 1 | 95 | 35 | 20 |
| 7/8 | | 45 | 30 |
| 3/4 | | 55 | 50 |
| 5/8 | | 65 | 60 |

C. *Average period of a Conflagration.*

*(Birmingham City Fire Brigade.)*

| Year. | No. of alarms. | No. of fires attended. | | | Time engaged in minutes. | | |
|---|---|---|---|---|---|---|---|
| | | Serious. | Slight. | Total. | Total. | Average per fire. | Average per alarm. |
| 1904 | 752 | 34 | 523 | 557 | 24,713 | 44·3 | 32·8 |
| 1905 | 783 | 22 | 592 | 614 | 26,298 | 42·8 | 33·5 |

## TABLE 11.

*Table Showing the strength of Stones under Various Conditions.*

A. *Effect of Contained Moisture.*

| Experimenter. | Stone. | Side of cube in c.m. | Crushing load in kilos. Stove dried. | Crushing load as % of that dry. | | |
|---|---|---|---|---|---|---|
| | | | | Stove dried. | Air dried. | Wet. |
| Delesse . . | Chalk | 10·0 | 86·2 | 100·0 | 27·3 | 21·6 |
| | „ | 5·0 | 36·4 | 100·0 | 64·8 | 35·4 |
| | Limestone | 5·0 | 42·7 | 100·0 | | 57·0 |
| | | Dry. | Immersion in Hot and Cold Water. | | | |
| | | Strength as percentages. | | | | |
| U.S.A. Engineers . | Granite | 100·0 | 83·7 | | | |
| | Marble | 100·0 | 46·2 | | | |
| | Limestone | 100·0 | 58·8 | | | |
| | Sandstone | 100·0 | 66·9 | | | |
| | Hard Brick | 100·0 | 85·0 | | | |

B. *Q. A. Gillmore's Experiments on the Effect of the Relative Dimensions of the Test Block on the Crushing Strength.*

| Stone. | Dimensions of Test Block in inches. | Area of cross section in square inches. | Crushing load in lbs. | Crushing Stress per square inch of area. |
|---|---|---|---|---|
| | | | | lbs. |
| Berea Sandstone. | 1 × 1 × 1 | 1 | 9,500 | 9,500 |
| | 2 × 2 × 1 | 4 | 76,000 | 19,000 |
| | 2 × 2 × 2 | 4 | 50,000 | 12,500 |
| | 2 × 2 × 4 | 4 | 44,000 | 11,000 |

c. *Experiments showing Effect of Dimensions and Relative Position of Natural Bed when testing, quoted by W. Young in Spon's Price Book.*

| Stone. | Dimension of Test Piece in inches. | Crushing Weight, lbs. square inch | | Percentage Ratios of Strength. | | |
|---|---|---|---|---|---|---|
| | | Against Bed. | On Bed. | On Bed. | Against Bed. | On Bed at several thicknesses. |
| Doulting Stone | 6 × 6 × 6 | 2,440 | 2,490 | 100 | 98 | 100 |
| | 6 × 6 × 12 | 2,190 | 2,260 | 100 | 97 | 91 |
| | 6 × 6 × 18 | 1,950 | 2,170 | 100 | 90 | 87 |
| | 6 × 6 × 24 | 1,836 | 2,100 | 100 | 87 | 84 |

## TABLE 12.

*Strength of Stone when soaked, subjected to a Freezing Temperature 3° below Zero, and thawed in Warm Water, the Process being repeated 20 times.*

| Stone. | Crushing Stress in lbs. per sq. inch to nearest 100lbs. | | Strength after freezing as a ratio of that before freezing. | | Disintegration. Percentage loss of weight. |
|---|---|---|---|---|---|
| | Before freezing. | After freezing. | Before | After. | |
| | (1) | (2) | (3) | (4) | (5) |
| Hard Blue Limestone ... | 24,000 | 26,200 | 100 | 109 | 0·06 |
| Iowa Marble ... ... | 12.100 | 12,600 | 100 | 104 | 0·07 |
| Gray Oolitic Limestone ... | 7,400 | 6,400 | 100 | 86 | 0·03 |
| Buff Magnesian Limestone | 6,600 | n.r. | 100 | n.r. | 4·65 |
| Buff Fossiliferous Limestone ... ... ... | 6.600 | 5,700 | 100 | 87 | 0·03 |
| Gray Blue Calcareous Sandstone ... ... | 6,900 | n.r. | 100 | n.r. | 1·85 |
| Berea Grit ... ... | 10,600 | n.r. | 100 | n.r. | 0·38 |
| Brown Red Sandstone ... | 5,000 | n.r. | 100 | n.r. | 3·77 |

NOTE—n.r. signifies that the stone disintegrated before it could be crushed.

The above table is an extract from Prof. A. Marston's experiments at Iowa State Agricultural College, U.S.A., in 1897.

## TABLE 13.

### A. *Table showing the Co-efficients of Expansion of various Stones.*

| Experimenter. | Granite. | Sandstone. | Marble. | Limestone. |
|---|---|---|---|---|
| | Expansion Co-efficient per °F. from 0° F. to 96° F. | | | |
| Colonel Totten, 1832 | ·000004825 | ·000009532 | ·00.0005668 | |
| Adie ... ... ... | ·00000438 | | ·00000613 | |
| Bartlett. 1832 ... | ·000004825 | ·000009534 | ·000005667 | |
| | Co-efficient of Permanent Swelling per °C. | | | |
| U.S.A. Engineers, Watertown Arsenal, 1895 ... ... | ·00045 | ·00023 | ·00045 | ·00035 |

### B. *Crystals of Rock-forming Material.*

| Rock-forming Crystal | Co-efficient of Cubical Expansion. per °C. | Co-efficients of Linear Axial Expansion. | | |
|---|---|---|---|---|
| | | 1st Axis. | 2nd Axis. | 3rd Axis. |
| Quartz ... | ·0000360 | ·00000769 | ·00001385 | ·00001385 |
| Adularia ... | ·00001790 | ·00001560 | ·00000066 | ·00000294 |
| Hornblende ... | ·0000284 | ·00000810 | ·00000084 | ·00000950 |
| Orthoclase ... | .0000170 | | | |
| Calcite ... | .0000200 | | | |
| Dolomite ... | ·0000350 | | | |

## TABLE 14.

### Co-efficients of Expansion.

A. *Linear Expansion of Sundry Materials used in Building.*

| Material. | Co-efficient of linear expansion per degree Centigrade for a range of temperature from 0° C. to 100° C. | Specific heat. | Co-efficient of thermal conductivity. |
|---|---|---|---|
| | (1) | (2) | (3) |
| Oak across grain ... | ·0000544 | | |
| Pine across grain ... | ·0000341 | | |
| Zinc ... ... ... | ·0000298 | ·0955 | ·303 |
| Lead... ... ... | ·0000280 | ·0314 | ·084 |
| Tin ... ... ... | ·0000230 | ·0562 | ·153 |
| Brass Wire ... ... | ·0000193 | | |
| Brass Ingot... ... | ·0000187 | ·0939 | ·204 |
| Copper ... ... | ·0000187 | ·0951 | ·719 |
| Steel... ... .. | ·0000120 | | |
| Wrought Iron ... | ·0000119 | ·1138 | ·210 |
| Mortar ... ... | ·0000118 | | ·158 |
| Cast Iron ... ... | ·0000112 | ·110 | ·210 |
| Plate Glass ... ... | ·0000089 | ·161 | ·0005 |
| Ordinary Brick ... | ·0000055 | | |
| Pine along grain ... | ·0000054 | | ·0004 |
| Oak along grain ... | ·0000049 | | ·0006 |
| Deal along grain ... | ·0000044 | | |

B. *Cubical Expansion of Water.*

| | Co-efficient of Expansion per °C. | Specific heat. | Co-efficient of thermal conductivity. |
|---|---|---|---|
| Cubical expansion of Water at 20° C ... | 0·00018 | 1·000 | ·00136 |

NOTE.—The co-efficient of expansion for water changes very rapidly with increase of temperature.

## TABLE 15.

*Equivalent Temperatures in Degrees.*

*Centigrade and Fahrenheit.*

| Degrees. | | Melting point of. | Sundry fixed Points. |
|---|---|---|---|
| Cent. | Fahr. | | |
| 0 | 32 | | Freezing point of water. |
| 100 | 212 | | Boiling point of water at atmospheric pressure. |
| 115 | 239 | Sulphur | |
| 230 | 446 | Tin | |
| 300 | 572 | | Maximum temperature in expansion and permanent swelling tests (Tables 6 & 7). |
| 326 | 619 | Lead | |
| 415 | 779 | Zinc | |
| 625 | 1157 | Aluminium | |
| 700 | 1292 | | Maximum temperature of the ordinary strength tests (Tables 2 & 3.) |
| 810 | 1490 | | Temperature of dissociation of pure limestone. |
| 817 | 1503 | | Maximum temperature of special strength tests (Table 5.) |
| 950 | 1742 | Silver | |
| 1000 | 1832 | Brass | |
| 1067 | 1953 | Gold | |
| 1100 | 2012 | Crown Glass | |
| 1100 | 2012 | Copper | |
| 1200 | 2192 | Cast Iron | |
| 1385 | 2525 | Steel | |
| 1583 | 2881 | Wrought Iron | |

## TABLE 16.

*Difference in Degrees Fahrenheit between the Greatest and Least Daily Temperature recorded during the Month, in an exposed Situation at Marlborough, Wiltshire, for a Period of* 16 *Years from* 1887 *to* 1902.

| Year. | Jan | Feb. | Mar. | Apr. | May. | June | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1887 | 41 | 34 | 53 | 47 | 41 | 51 | 46 | 54 | 44 | 39 | 35 | 35 |
| 1888 | 42 | 46 | 54 | 50 | 60 | 57 | 50 | 51 | 46 | 46 | 28 | 28 |
| 1889 | 46 | 52 | 53 | 38 | 50 | 60 | 60 | 63 | 70 | 50 | 54 | 48 |
| 1890 | 50 | 46 | 68 | 64 | 68 | 67 | 61 | 67 | 62 | 61 | 60 | 44 |
| 1891 | 60 | 60 | 64 | 67 | 76 | 69 | 63 | 53 | 60 | 66 | 49 | 50 |
| 1892 | 55 | 66 | 64 | 66 | 72 | 72 | 62 | 57 | 62 | 61 | 51 | 48 |
| 1893 | 59 | 51 | 67 | 72 | 69 | 80 | 67 | 65 | 60 | 63 | 54 | 54 |
| 1894 | 58 | 56 | 63 | 60 | 63 | 65 | 69 | 60 | 58 | 53 | 48 | 38 |
| 1895 | 53 | 65 | 71 | 61 | 74 | 76 | 62 | 64 | 69 | 68 | 49 | 44 |
| 1896 | 50 | 56 | 62 | 65 | 76 | 76 | 76 | 67 | 58 | 61 | 50 | 45 |
| 1897 | 55 | 54 | 61 | 75 | 79 | 75 | 77 | 68 | 62 | 63 | 50 | 45 |
| 1898 | 45 | 53 | 63 | 69 | 73 | 68 | 73 | 69 | 80 | 58 | 57 | 48 |
| 1899 | 51 | 66 | 72 | 61 | 73 | 78 | 76 | 78 | 76 | 59 | 53 | 55 |
| 1900 | 48 | 75 | 60 | 77 | 74 | 69 | 89 | 65 | 67 | 64 | 51 | 41 |
| 1901 | 46 | 48 | 51 | 73 | 77 | 69 | 70 | 69 | 64 | 64 | 56 | 48 |
| 1902 | 49 | 57 | 57 | 64 | 70 | 69 | 71 | 65 | 69 | 56 | 52 | 51 |

*Extremes and Means of above Records.*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum difference | 60 | 75 | 72 | 77 | 79 | 80 | 89 | 78 | 80 | 68 | 57 | 55 |
| Minimum difference | 41 | 34 | 51 | 38 | 41 | 51 | 46 | 51 | 44 | 39 | 28 | 28 |
| Mean difference | 50 | 55 | 61 | 63 | 68 | 69 | 67 | 63 | 63 | 58 | 50 | 45 |

## TABLE 17.

TOWN .....

| Building Material of Walls ... | Brick. | | | Granite. | | | Sandstone. Coarse. | | | Sandstone. Fine. | | | Oolitic Freestone. | | | Ferro Concrete. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Building Material of Floors ... (see footnote.) | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| No. of Destructive Fires in Years (total of 3 undermentioned details). | | | | | | | | | | | | | | | | | | |
| Cottage... ... | | | | | | | | | | | | | | | | | | |
| Private Residence | | | | | | | | | | | | | | | | | | |
| Warehouse (see footnote) ... | | | | | | | | | | | | | | | | | | |
| Factory (see footnote) ... ... | | | | | | | | | | | | | | | | | | |
| No. of Buildings collapsed after or during a Conflagration. | | | | | | | | | | | | | | | | | | |
| Cottage... ... | | | | | | | | | | | | | | | | | | |
| Private Residence | | | | | | | | | | | | | | | | | | |
| Warehouse ... | | | | | | | | | | | | | | | | | | |
| Factory ... ... | | | | | | | | | | | | | | | | | | |
| No. of Buildings requiring Demolition after a Conflagration previous to Rebuilding. | | | | | | | | | | | | | | | | | | |
| Cottage... ... | | | | | | | | | | | | | | | | | | |
| Private Residence | | | | | | | | | | | | | | | | | | |
| Warehouse ... | | | | | | | | | | | | | | | | | | |
| Factory ... ... | | | | | | | | | | | | | | | | | | |
| No. of Buildings fit for use again after replacing Roof, Floors, Windows, Doors, &c. (walls sufficiently intact). | | | | | | | | | | | | | | | | | | |
| Cottage... ... | | | | | | | | | | | | | | | | | | |
| Private Residence | | | | | | | | | | | | | | | | | | |
| Warehouse ... | | | | | | | | | | | | | | | | | | |
| Factory ... ... | | | | | | | | | | | | | | | | | | |

NOTE.—Floor No. 1 is a floor of boarding supported on wood joists.
Floor No. 2 is a floor of boarding supported on steel or iron joists.
Floor No. 3 is a floor of concrete with steel joists supporting it or embedded in it.
Warehouse implies heavy floor loads.
Factory implies light floor loads.

Greatest pressure on mains in pounds per square inch, or feet of water available at nozzle at street level.
Least pressure on mains in pounds per square inch, or feet of water available at nozzle at street level.
Greatest pressure induced by fire engine.
Height of highest building in feet above street level.
Height of average building in feet above street level.
What is approximately the greatest temperature of a fire in your experience?
No. of fires in which lead has melted 326° C. 619° F.
No. of fires in which zinc has melted 415° C. 779° F.
No. of fires in which brass has melted 1000° C. 1832° F.

Mr. A. VERNON (Past President) said he felt sure that every Member present shared his feeling of gratitude to the author of this interesting and useful Paper. The subject and the author's mode of treatment were novel, and the conclusions at which he arrived as a result of his painstaking research must prove of the greatest value. The Paper hardly lent itself to immediate discussion, but he was sure all would agree that it afforded a very practical summary of most important information for inclusion in the *Transactions* of The Institution.

He had been struck first of all by the extremely minute, intricate, and careful research which the preparation of the Paper must have involved. It was sometimes said that England was behind other nations in practical research, but such papers as the one just read must tend to add to our national reputation for the careful and painstaking scientific investigation of an obscure, but nevertheless vitally important, subject.

It was not unusual to regard igneous stones—produced as they were by fire—as the best for resisting heat, and it was somewhat surprising to hear that red granite was a distinctly treacherous material, and that grey granite was like the red, only a little worse. It was also disturbing to hear that chalk rag or any similar material was likely, in case of fire, to disappear altogether or to assume the form of chalk dust, for he knew of at least one case where an enormous sum had lately been spent in building a chalkstone mansion overlooking the River Thames.

Reference had also been made to the undesirability of mixing materials, having regard to their different ratios of expansion. He was for 12 years in charge of a very busy fire brigade in a very inflammable locality

in the country, where fires were frequent, and his own experience led him to divide buildings into three kinds. The kind which the fireman liked best was the old timber building, where no beams collapsed without some warning of what was about to happen. Next came a stone or brick one, and the one he liked least was that into which iron, and especially cast iron, was largely introduced, for this meant risks and surprises of all kinds.

The time seemed to be approaching when the warnings given in the Paper must be taken seriously to heart.

He had always regarded enormous houses such as the "sky-scrapers" of New York, or even the high buildings in the City of London, as being not without serious risk if constructed of iron or steel, with stone-work as a mere filling in, in the shape of panels. It was fairly certain that the panels would do as they did at San Francisco. When the iron expanded too much to hold the stone, it would fall outwards and leave a skeleton frame; but on the other hand it was a matter of consolation to find that the iron-framed houses in the San Francisco disaster had resisted earthquake better than the solid stone buildings, and were better altogether than their inferior frame structures or timber buildings. He thought the lesson to be learned was that, if iron and stone were built together, each must be rendered independent of the other, and, if possible, room must be given for expansion, as in the great Gallerie des Machines in Paris, where some six or eight inches was allowed for the movement due to variations of temperature.

It gave him the greatest pleasure to ask the Meeting to accord a hearty vote of thanks to the author of the Paper, which would be most valuable for after reference, although difficult to discuss adequately on first hearing it read.

Mr. EDWIN O. SACHS, Chairman of the British Fire Prevention Committee (Visitor) said he was glad to be allowed the opportunity of seconding the vote of thanks to the author of the Paper, which was of the greatest value and interest to all concerned with the subject of fire protection. The painstaking way in which the sections of stone had been tested, not only as to resistance but also as to expansion, was beyond all praise, and he felt sure that the circularisation of the results among the younger members of the profession would be of the greatest possible value to them.

He was particularly struck with the results of the tests as to the expansion of different forms of stone, which explained much regarding the failure of certain buildings, due to the varying ratios of expansion of different stones. But while granite and the different freestones expanded very differently from metal, concrete did not, he believed, expand so very differently, and any further research in this direction would, he expected, furnish some very interesting data on that subject. The results given in the Paper as regards fire resistance seemed to him of primary importance as indicating the method of selection of concrete aggregates.

He did not think any architect, in designing a fire-resisting building, or even any fire-resisting portion of a building, such as a staircase, would use any stone, particularly freestone. It was generally recognised that a stone façade would spall and disintegrate at varying degrees of temperature according to the stone used, and that stone staircases were dangerous.

In the case of concrete aggregates sufficient care in the selection of the aggregates was not usually exercised, although their behaviour under exposure to heat was of the greatest possible importance, and the data showing

how stones from different quarries had varying qualities of fire-resistance and different co-efficients of strength and expansion would add enormously to the knowledge at the disposal of those who had occasion to select concrete aggregates, especially when used in combination with, or as a protective to, steel work in buildings.

On one little point he differed from the author of the Paper, who said he must regard as practically valueless all conclusions derived from experiments conducted in little rooms.

He agreed that the exhibition tests, mostly arranged by inventors and carried out on the Millbank site, about 10 or 20 years ago, were of very little practical value, but he believed the recent experiments conducted by the Fire Prevention Committee, with the aid of gas at very high temperatures, regulated step by step up to 2,200 degrees Fahrenheit and kept at various known temperatures, in huts of standard sizes, had taught architects, surveyors, and engineers a very great deal. However much one must admire laboratory tests, there was also, he believed, great value in work done under conditions of actual practice, *i.e.* in what were known as "full-size" tests. Such tests were now recognised as standard ones by the leading public authorities at home and abroad.

With regard to the range of temperatures for those tests, the author of the Paper had, he thought, taken the temperature a little lower than the results of actual big fires had taught one to provide for. He believed that silver was found melted at the Cripplegate fire and that the brass parts of typewriting machines were found to be fused. That, according to the table, meant 1,000 degrees Celsius and 950 degrees Celsius respectively.

Valuable research work was done after the Baltimore

fire by Professor Norton, and the results were published. There again parts of the typewriting machines served as a very good basis for judging what happened in the different rooms, and the conclusion arrived at by Professor Norton was, he thought, 1,800 degrees as the probable average temperature in individual large buildings. This branch of the work of research should certainly be followed up, and anything that could be done by fire brigade officers in their leisure (if they ever had any) to pick up, for instance, metal parts, would teach a good deal as to what took place in different rooms variously occupied.

With reference to research work generally, he might call attention to some private research in the direction of expansion of materials in laboratory tests by Professor Woolson of New York, and he might also state that the United States Government appointed, a few weeks ago, an Advisory Board to investigate practically the fire resistance of all materials used in building, representatives of the leading technical societies composing the Board.

Coming back to the question of the actual materials used in building, he was glad to say that it was possible to a great extent to protect steel frame buildings against fire. This protection could be made theoretically perfect, and he used the word "theoretically" advisedly, because, while one could protect steel girders with concrete such as clinker or slag concrete and the like, the difficulty was to get the concrete properly applied as a protective to the steel. It was all very well in theory, and for the purpose of tests, to have metal work protected and see how it would stand, but in actual practice it would require a good deal of skilled supervision to ensure that the work was efficiently done, and this was a matter of expense.

It would probably mean 5 per cent. additional cost on the carcase of a building for the necessary good quality of material and additional supervision to obtain real fire resistance, *i.e.* 5 per cent. above the actual cost of the usual trade materials applied unintelligently, from a fire-resisting point of view.

It might, he thought, interest the Meeting to know that the Committee he was associated with had arranged with three or four gentlemen in the United States of considerable technical knowledge to prepare reports on the San Francisco conflagration, so that before long the Committee hoped to have fairly independent reports on that great fire available for the use of its members.

Mr. HENRY LOVEGROVE (Fellow) said he agreed with the author of the Paper rather than with Mr. Sachs on the question of proper tests being afforded by a small room. He thought the conditions varied so much that a proper test of what he might call a make-believe kind could not well be made, and experiments under such conditions could not be of much value.

With reference to the temperature reached during a fire, he thought that in most London fires it never rose above 300 or 400 degrees C., for the Fire Brigade were generally so soon at work that the place was deluged with water, and the fire was put out in a few minutes. He had known many fires of late years which were confined to one room of a building, showing that the Brigade had worked efficiently, notwithstanding the criticism to which it was sometimes subjected. Only recently a man had told him that he did not mind the fire so much as the water, which had nearly drowned his place, and had made it necessary to cut a hole in the floor to let it run away again.

He believed that in a fire the age of the walls made a greater difference than one would imagine. He was recently at a fire where the brickwork was comparatively new and very well built, and there was scarcely any injury at all. Perhaps the firemen had knocked off a bit of the coping, but that was practically the only damage he could see. The roof and floors had, of course, disappeared, but the walls stood. In a building 30, 40, or 50 years old the brickwork would be found very much charred in a similar case, and so rotten, buckled and bulged that much of it would have to be removed before rebuilding.

He was rather disappointed to hear of the untrustworthiness of that old friend, granite. It was true that granite was only used in London for the ground floor fronts of buildings, which were not likely to be seriously affected by a fire. The upper floors generally suffered most, so he could not, of his own experience, speak of the results in the case of granite.

With reference to Mr. Sach's remarks about stairs, he believed well-made concrete stairs, such as those constructed under the Factories Acts, were about the best that could be used, though he was also a great believer in teak. He believed he had been one of the first to introduce teak for that purpose, and he was sure that in great fires it behaved quite as well as patent concrete, and better than York stone, which frequently calcined in a fire. Boxground stone would crack and sometimes flake, but he thought that, as a rule, it would stand fire fairly well.

He agreed with what had been said as to stone incorporated with iron structures. He had found that, where stone was used directly on girders, the ironwork had buckled and seriously affected the brickwork above.

The great modern buildings composed mainly of steel would, he feared, one day prove most disastrous. Every possible precaution might be taken to protect the steel work, but in the case of the important girders expansion might take place at a fire, and he was afraid the buildings would come to grief as did those in San Francisco. He hoped that not many lofty buildings would be constructed in London on that principle.

Captain J. de Courcy Hamilton, R.N. (Retired), Chief Officer of the London Fire Brigade (Visitor), said he spoke with some diffidence, as he had already had an opportunity of reading the Paper and found it to be beyond him, for he did not profess to look at such matters from such a deeply scientific point of view. He thought the Paper in many ways dealt more with what would have to be done with a building after a fire than with what would occur during the fire, as the whole of the fabric was not heated in the same manner. It was of the greatest value to know, in the case of certain buildings, whether they should be pulled down or not, owing to their reduced stability due to the action of the heat, and that seemed to him to be the main question dealt with in the Paper. There is no doubt that the way in which a building would behave in the case of a severe fire depended a great deal on the expansion of the various materials used in its construction, owing to change of temperature.

If there were not a large amount of combustible material in a building, and it was of reasonable height, a structure of stone and iron might stand what was required of it. If the same building were filled with materials such as were found in many London ware-

houses, it would be agreed that, under the action of great heat, it would probably come to the ground.

The amount of heat generated in a fire was a very difficult matter to estimate, but, in some of the London fires during the short time he had been in command of the London Fire Brigade, he had seen bricks absolutely glazed up and down the inside walls. What temperature that indicated he did not know, but perhaps the author of the Paper would be able to give the information, which he thought would be very interesting.

Many electric fires had now to be dealt with, where, in the case of a large arc, almost everything would melt. Large lumps of copper, iron, and lead all run into one and mixed with stone, had been found at such fires, where gas pipes, water pipes and electric mains all ran close together.

From a fireman's point of view he liked bricks, but as to whether old or new bricks were preferable he had no opinion. There were good and bad bricks, and he certainly preferred good bricks, which he believed would best stand fire.

In regard to timber, obviously hard wood was best everywhere, and teak was about the hardest wood that could be used for building material. There was no question as to the value of good solid wooden beams. In a building where a large fire was going, an old oak beam would, without expanding, smoulder away and take about a week to burn through.

It was not his object, whilst a fire was in progress, to ascertain what was the strain or what were the different materials. His aim was to get at the fire as quickly as possible and put it out. The last speaker inferred that the Brigade too often flooded it out; but they used as little water as possible, because they always

had to remember that the salvage corps were about and would view property being drowned out with mixed feelings. There was no doubt that water increased the strain and stress on a building on fire, owing to the additional weight when absorbed in the material stored, and to accumulation on floors, and the danger was increased in proportion to the weakened state of the structure consequent on the action of heat.

Paragraph 5 of the author's general conclusions dealt with matters of which he took a very serious view, and upon which, it would be remembered, there had been considerable discussion at the time of the preparation of the London Building Act Amendment Act, 1905. The question of stair-wells and lift-wells was undoubtedly a serious one. When he arrived at any big building on fire his principal anxiety was whether the lift-wells and stair-wells had been attended to, for he considered that if those portions had been captured it was possible to stop the fire; but when the fire had got to a certain point he knew it was hopeless to try to stop it without some help from other walls or well-built buildings.

Several interesting lectures had been given by Professor Vivian Lewes of the Royal Naval College, Greenwich, on the subject, in which he referred to the fact that in some cases, where enormous heat was generated, the water was converted into steam and vapour, which tended to assist the flames rather than put them out.

The vote of thanks having been put to the Meeting and carried unanimously.

Mr. BALDWIN-WISEMAN, in reply, wished to express his thanks for all the kind things which had been said

of the Paper, which he felt was quite unworthy of so much honour.

In reply to Mr. Sachs, he should like to say that he thought he had taken the paragraph he referred to too literally. That paragraph was simply written in view of some of the experiments which he had followed from time to time in the press, but which he had not had the opportunity of personally witnessing, as he had the misfortune to live in the provinces instead of in London. He thought that if Mr. Sachs would read that paragraph with the context, it would convey the sense in which Mr. Lovegrove had read it—*i.e.* that a small room would not give similar results, no matter how the temperature were controlled, as would be attained by a fierce fire, say in a Manchester warehouse.

He had lived in Manchester for some years, and had seen cotton-mill fires, which he thought Captain Hamilton would agree were among the most serious that occurred. and he believed that no experiments in a room, though it might be of a fair size, would give results approximating in any way to that of one of these large fires. He also doubted the experimental reliability of controlled gas furnaces, as he had had a considerable experience of the extreme difficulty of maintaining a constant temperature with gas furnaces for any considerable period.

Some high temperatures—1,200° C. he thought—were referred to by Mr. Sachs. His maximum experimental temperature was about 820° C., or, say, 1,500° F.; but although such high temperatures as 1,200° C. were obtained in fancy tests and in occasional fires, still, as Mr. Lovegrove had pointed out, the temperature of the average fire was limited to about 500° C. or 600° C.

He was glad to find that Mr. Lovegrove confirmed his theory that old buildings did not withstand fire so

well as new. He had pointed out, in another Paper, that building material which contained a large amount of moisture was much weaker than when it was absolutely dry.

With regard to Boxground stone, he found that the initial strength depreciated in compression to 49 per cent. and 54 per cent., so that although the strength might be reduced by roughly one-half, provided the factor of safety used in the original design was sufficiently high, say 2, 3 or more, as was frequently the case, it would still carry a moderate load with comparative safety, and thus would stand after a fairly fierce fire, as Mr. Lovegrove had found to be the case.

He desired specially to express his sincere thanks to Captain Hamilton for having honoured the reading of his Paper by his presence. Captain Hamilton mentioned cases where he had seen bricks glazed by a fire inside a building. Though he had done a lot of research work at high temperatures he could not quote off-hand the temperature that would be necessary to produce that effect, but he should say it would be much higher than any he had quoted in his Paper.

The fusion of brick was largely a question of the relative proportions of the constituent silica and alumina, and de Saint-Hardouin in his research, published in 1904, shewed that, whereas china clay or fire clay alone fused at 1,780° C., the addition of 20 per cent. of alumina raised the melting point to 1,810° C., whilst additions of 20 per cent. of red lead, white glass, ferric oxide, and carbonate of lime lowered the temperature of fusion in the several cases to 1,770° C., 1,710° C., 1,610° C., and 1,450° C. respectively; and von Schwartz in his book on *Fires and Explosion Risks* gave the following amongst other temperatures:

**Temperature of glazing kiln for porcelain - 1,350° C.**
**Temperature of glazing kiln for hard porcelain 1,500° C.**
**Temperature of kilning bricks, tiles, &c., 1,100° C. to 1,400° C.**
**Temperature of formation of blast furnace slag 1,400° C. to 1,600° C.**

In the case of copper, iron and lead melted into one block, he did not think that necessarily indicated such a very high temperature during a fire, or was so reliable an indicator of temperature as a fused block of a single metal, for in the high temperature produced by short circuiting the melting point of the copper might be exceeded, giving rise to its fusion with other metals in its vicinity, and it was well known that the melting point of alloys was frequently considerably lower than that of the constituent metals. Thus the eutectic alloy, containing copper and silver in the atomic percentages of 40 and 60, melted at 304° C. and 189° C. below the melting points of the component metals.

The PRESIDENT, in summing up the discussion, said the Paper was certainly an exceedingly clever and able one, and contained an immense amount of valuable information and data. The tables, he thought, would be of considerable assistance to all engaged scientifically and practically in architectural work, and he would suggest that the author might well forward copies to San Francisco as rapidly as possible, for the guidance of those who were about to rebuild that unfortunate city.

The Members would agree with him in an expression of indebtedness to the chief officer of the London Fire Brigade for the excellent remarks he had made. While discussing the scientific aspect of such a question, it was valuable to have the practical experience of one so competent to speak with authority.

The Meeting then adjourned.

PAPERS 321, 322, 323. }
NOS. 499, 500, 501. }

# THE VISIT TO BIRMINGHAM.

AT

## THE ORDINARY GENERAL MEETING

*Held in Birmingham, May 24th*, 1906.

The Members of The Institution taking part in the visit were received at the Council House by the Right Honourable the Lord Mayor of Birmingham (Councillor Reynolds), who said that, on behalf of his fellow citizens of Birmingham, it gave him great pleasure to welcome the representatives of so large and important an Institution, whose members practised a profession requiring expert knowledge of a high order, combined with those other qualifications which go to make the man and the gentleman. He was glad to find, from the information he had received as to the objects and scope of The Institution, that the ideals aimed at were high, and that every endeavour was being made to attain them. Like the guilds established in London and elsewhere in the Middle Ages, such a body must strive in the first place to attain a high degree of technical efficiency, and with it to incorporate those wider intellectual interests which can only be obtained by a liberal education in other respects.

He learned that, with this object in view, and to connect the members with the higher educational organisa-

tions, The Institution now offered scholarships at the Universities of Cambridge and North Wales, and at the Armstrong College at Newcastle-on-Tyne, so that coming Members might have that university and higher education which was rightly considered so valuable an adjunct to every learned profession.

He understood that the 4,000 Members represented all parts of the Empire, some 50 coming from the Colonies; but at the same time he was glad to see that The Institution did not trust in numbers only, but in the qualifications possessed by those who wished to be included in its ranks. He found that, out of the 530 who entered for the qualifying examinations in March, the percentage of successes was 64. Thus, while a satisfactory number gained admission, the fact that 36 per cent. failed to do so showed that the examinations were framed with a view to keeping the status of the profession at a high level.

Having been especially interested in the public libraries of the City during the time that he had been a member of the City Council, he was glad to see that there was a valuable library in connection with the Institution. It was scarcely necessary for him to emphasise the value of such a library and the desirability of its being kept up to date by the addition, as they are published, of such books for reference and perusal as bore on the subjects with which surveyors were most concerned.

An important part of the duty of such an institution was to study and discuss contemplated or actual legislation on the various subjects in which the profession was naturally interested. He found that such questions as the Land Valuation Bill, the Land Tenure Bill, and the taxation of land values had recently occupied their

attention, and that The Institution had been able to influence and modify legislative proposals from an expert point of view. It was for the public benefit that such a professional body was able and willing to take up these more or less difficult subjects, and to discuss them apart from mere sentiment and outside the arena of political strife. In addition to the business to be transacted in that chamber—and he was sorry to see that the first item on the programme, an address by Sir Oliver Lodge, would have to be omitted in consequence of his illness, which he was sure all would very much deplore—visits had been arranged to the new University, to two of the municipal undertakings, and to several business establishments. He need scarcely say that the public buildings were always available to any visitors wishing to inspect them.

Then he noticed that visits were to be paid to Kenilworth, Warwick, Stratford-on-Avon, and Worcester. These names at once indicated places of the greatest possible interest within easy reach, which he was sure would repay the time spent upon them. In repeating his hearty welcome, he expressed a hope that the visit would prove of much benefit to The Surveyors' Institution, and that, when it was over, the Members would carry back with them pleasant reminiscences of Birmingham.

The PRESIDENT, in reply, said that on behalf of the Council and the Members present he desired to thank his lordship very heartily for the exceedingly cordial way in which he had welcomed them to that great city. Many had no doubt visited Birmingham on previous occasions, for business or for other purposes, but in any

case they would fully appreciate the attractions of what had been called the Metropolis of the Midlands. As his lordship had said, there were many magnificent public buildings in Birmingham, for example, the Council Chamber in which they were now assembled, with the Art Gallery and Museum adjoining, the Victoria Law Courts, the Town Hall, and many others. These would all fully repay a visit, and he would also remind the Members that, quite recently, Birmingham, with that enterprise for which its citizens were noted, had initiated, and now possessed, a chartered University which had for its Chancellor no less distinguished a gentleman than the Right Honourable J. Chamberlain, M.P. He could not well conceive anything of greater advantage to the vast population (more than half a million) of such a city than to have in its midst a first-class University.

He would like also to call the attention of Members to another very fine old institution in Birmingham, the Grammar School of King Edward VI., founded in 1552, which had produced many men of great mental calibre, among its distinguished *alumni* being the late Archbishop of Canterbury, Dr. Benson, Bishop Lightfoot, and Bishop Westcott. Birmingham also produced that eminent artist, the late Sir Edward Burne-Jones, whilst among its distinguished sons still with us was Principal Dale, Vice-Chancellor of the Liverpool University, who was educated at King Edward's Grammar School.

So far as surveyors were concerned, one name was a household word in Birmingham: he referred to the name of Mathews. All who had been prominently connected with the profession during the past 40 years had been brought into contact with the late Mr. William Mathews He was himself old enough to remember the eminent

Mr. Jeremiah Mathews, and he knew that the family had done great work in the interests of the profession.

He would not now take up more time, but would repeat his thanks to the Lord Mayor for his very cordial welcome to the great City over which he presided.

The Lord Mayor having retired, the President, in declaring the Conference open, read a letter announcing that Sir Oliver Lodge, F.R.S., who had promised to open the proceedings with an address, had been compelled, by an attack of influenza, to abandon his intention. He was sure all present would cordially join him in an expression of sympathy with Sir Oliver Lodge, and of regret that they should have missed the opportunity of hearing an address from so distinguished a citizen of Birmingham.

The following Papers were then read :—

PAPER 321.
No. 499.

FIRST PAPER.

# A FEW OBSERVATIONS
UPON THE
# HISTORY AND DEVELOPMENT OF BIRMINGHAM.

BY H. A. PRITCHARD, DEPUTY TOWN CLERK.

To attempt more than a cursory and imperfect account of the history of a large manufacturing centre in the space of a short Paper is of course impossible, but a glance at some of the leading events in the development of the capital of the Midlands may prove of some interest. Birmingham, to persons unacquainted with its history, conveys the idea of a modern town, the centre of recent industrial enterprise, but as a matter of fact it ranks with some of the oldest towns in the country. Whether from its geographical position or from the fact that it never formed the site of a fortified town, Birmingham presents in its early history few of those incidents which, reflecting passing events of the times, attach to so many old towns in this country. Although local historians have indulged in speculative theories as to its early history and origin, the first authentic reference is found in the Doomsday Book, where it is recorded that "Richard holds of William

"(Fitz Ausculf) four hides in Birmingha. The arable "employs six ploughs, one is the demesne. There are "five villeins and four borders with two ploughs. "Wood half a mile long and four furlongs broad. It "was and is worth 20*s*." Ulwine held it freely in the time of King Edward. The Manor of Birmingham passed into the hands of the Bermingham family, with whom it remained until the time of Edward VI., and to whose memory there are some fine tombs in St. Martin's Church, the oldest ecclesiastical foundation in the city. Apart from the records of this family there is little authentic account of the town for a long period, but from a list of the inhabitants of Birmingham in 1327 in the Public Record Office it appears that at this time there were 75 persons possessing goods to the value of 10*s*. and upwards. The town appears now to have arrived at sufficient size and importance to induce an effort to establish some form of local government, and upon the application of the bailiffs and commonalty and after an inquisition held, Richard II. granted letters patent and a licence in Mortmain for the establishment of "the gild of the Holy Cross." This guild appears to have been constituted partly a religious and partly a charitable organisation, but it is recorded that out of its endowment it maintained "a bellman, a midwife, and an organist." The rest of its funds, after certain charitable dispositions, were applied in the repair of "two stone bridges and divers foule and dangerous "highways."

The guild possessed a Guild Hall or Town Hall, which occupied the site of the present Grammar School in New Street. Upon the dissolution of the monasteries King Henry VIII.'s Commissioners, with an octopus-like desire to gather in everything they could, treated the

guild as a solely religious institution and confiscated its lands, but Edward VI. restored them as an endowment for the Free Grammar School, now one of the leading educational institutions in the city. Towards the middle of the sixteenth century the population and industrial enterprise appear to have considerably progressed, and Leyland's well-known description as he passed through in 1538 gives us an interesting idea of the condition of the town at that time. He states: "I "came through a pretty street or ever I entred into "Birmingham town. This street as I remember is "called Dirtey (Deritend). In it dwell smiths and "cutlers, and there is a brook that divideth this street "from Birmingham, and is an hamlett or member "belonging to the parish thereby." After some further description he continues: "There be many smiths in the "towne that use to make knives and all manner of "cuttinge tooles and many lorriners that make bittes "and a great many naylors. Soe that a great part of "the towne is maintained by smiths who have their "iron and sea coal out of Staffordshire."

The town must at this early period have attained a reputation for its metal work, and if a conclusion may be arrived at from the numbers employed, its craftsmen must have attained a market for their wares far beyond its own borders. Camden visiting the town nearly 50 years later states: "I came next to Solyhul which has "nothing remarkable but its church then to Bromwicham "swarming with inhabitants and echoing with the noise "of anvils (for here are a great many smiths)."

The inhabitants of Birmingham have always been advocates for liberty and the freedom of the subject, and we find them strong Parliamentarians in the Civil Wars of Charles I. Their partisanship led them to fiercely

oppose the Royalists, and Prince Rupert, while passing through Birmingham from Camp Hill early in 1642, was stubbornly resisted by the townsmen.

Marching with about 2,000 men, horse and foot, he was twice beaten off by the Birmingham people, but eventually entered, and in retaliation caused about 80 houses to be burnt to the ground.

The latter portion of the seventeenth century saw a period of prosperity and advancement, and it is noteworthy that at this period a manufacture now so well established was first introduced.

Hitherto firearms had always been obtained from abroad, and William III. is said to have been dissatisfied that guns were not procurable in this country. Sir Richard Newdigate, being of opinion that the Birmingham craftsmen could construct a good gun if supplied with a pattern, advised His Majesty to give them a trial, with the result that specimens were forwarded. The Birmingham artificers proved quite equal to Sir Richard Newdigate's opinion of them, and the guns manufactured were so eminently successful that a large trade sprung into existence, which has since formed, and still forms, such a prominent local industry.

At the close of the seventeenth century the inhabitants probably numbered about 15,000, and in consequence of its extension and the increase of the population, it was felt a few years later that the spiritual needs of the people demanded an additional church.

An Act of Parliament having been obtained for this purpose in 1711, a Mr. Robert Phillips presented a site then known as the Barley Close, and now forming a fine open space opposite Colmore Row, upon which the present church of St. Phillip was erected, destined to become the future Birmingham Cathedral.

While few events characterise the early part of the eighteenth century the latter part is full of interest.

Until the period we are about to discuss, Birmingham possessed no institution, apart from the infirmary attached to the workhouse, whereby the suffering poor could obtain relief, but in November, 1765, Dr. John Ash, a celebrated local physician, issued a notice and convened a meeting of the leading inhabitants, when it was resolved to establish a General Hospital. Subscriptions were collected, a site in Summer Lane chosen and acquired, and the building commenced, but funds were not sufficient. To assist, it was decided to hold a "musical entertainment for the benefit of the Hospital." A committee was formed, and the first Musical Festival in Birmingham held. Although a great success, the amount realised was still insufficient, and the Hospital remained unfinished for several years. A fresh subscription list was started, and the trustees resolved to hold another Musical Festival. Eventually the Hospital was completed and formally opened on the 20th September, 1779. Gradually extensions were made to meet the growing requirements of the town, but after occupying the site for about 118 years it was thought desirable that a new building should be erected in a more convenient and suitable neighbourhood.

Originally built within sight of green fields and trees, the Hospital became gradually surrounded by factories and buildings, the demands upon its resources were greatly increased, and it was found highly desirable that an effort should be made to erect a new and improved building.

Accordingly early in 1891 a scheme for a new Hospital was introduced, which met with a generous and speedy response, and the new General Hospital

was erected and opened free from debt, at a cost of £210,000.

The foundation stone was laid by the Prince and Princess of Wales (then the Duke and Duchess of York), and the Hospital was opened on the 7th of July, 1897, by Princess Christian, representing Her late Majesty.

The new General Hospital faces Steelhouse Lane at the corner of Corporation Street. It contains accommodation for 346 beds, is a magnificent building, and forms one of the finest institutions of its kind in the country.

The Musical Festivals referred to were the origin of and became the Birmingham Triennial Festivals, which are now such a feature of the city, and have been held continuously for more than one hundred years with conspicuous success.

They have become perhaps the most important musical meetings in the country, and pay over a large sum every three years to the funds of the Hospital. The total amount received by the Hospital since their commencement from this source is £147,605, and in addition a fine organ in the Town Hall, valued at £5,000, together with a large library of music, belongs to the Hospital, the costs having been defrayed out of the receipts.

But it is necessary to return to the period under discussion. The year 1769 saw the first serious effort to establish a competent local governing body. Although the promoters of the measure met with considerable opposition, an Act known as the "Lamp Act" was obtained in May of that year, whereby 50 Street Commissioners were appointed to control the lighting and cleansing of the streets with limited rating authority. Their powers were extended by subsequent Acts, but the

Commissioners have long ceased to exist, and their authority is now vested in the City Council.

To turn to the progress of the manufactures of Birmingham, we find that the latter part of the eighteenth century inaugurated what proved to be a revolution in industrial enterprise.

The invention and practical development of steam power, the partnership of Matthew Boulton and James Watt, who together with William Murdoch, the inventor of gas lighting, and the other members of the famous Soho Circle, effected a stimulus to the trade and manufacture of the town from which it has never receded. These great captains of industry have by their achievements, ability, and enterprise laid the city of Birmingham under a debt it can never repay, and have conferred upon the civilised world benefits which will cause their names to endure for ever.

The close of the century was unfortunately marred by one of those risings of the unthinking populace which, without attaining any good purpose, cause wanton loss and suffering to a large part of the community.

In consequence of certain religious differences, the mob were incited to commit some deplorable outrages upon the property of certain private citizens, several houses were sacked and burnt, including that of Dr. Priestley, one of the leaders of the Nonconformist section, and the rioters were only dispersed by the arrival of a military force.

We now arrive at the commencement of, the nineteenth century; and it is interesting to note here that, at the national census in 1801, the population of Birmingham numbered 73,670 persons and the town contained 15,630 houses. Thus, in the space of a hundred years, the number of inhabitants had increased

nearly fourfold. The first half of the century under review is remarkable for that active and strenuous assertion of public opinion displayed by the townspeople of Birmingham, which so largely conduced to the alteration in parliamentary representation brought about by the Reform Act, 1832. A period of trade depression throughout the country caused widespread want and distress among the working classes, and from the nature of its industries, many of the inhabitants of the town, consisting largely of artizans, felt the privation keenly. To bring about an amelioration of the condition of the country the leaders of liberal thought were bent upon obtaining a more representative Parliament.

To this end a number of the prominent townsmen formed the famous Birmingham Hampden Club, having for its avowed object constitutional reform. The members met in various places, but falling under suspicion and the distrust of the governing classes, they were obliged eventually to resort to meeting in the open air upon New Hall Hill. These meetings, attended by vast assemblies, were conducted in a peaceable and orderly manner, but the sentiments expressed by the leaders, and what was then considered their revolutionary attitude, aroused such consternation that, with a view to preventing their meetings, and those of similar associations throughout the country, the Government applied for and obtained the suspension of the Habeas Corpus Act, which had the effect of dissolving the Hampden Club and putting an end to the meetings for some time.

Still the distress continued, and Birmingham having no parliamentary representative, the New Hall Hill meetings were resumed, and the reformers appointed what they termed a Legislatorial Attorney to represent

their case to the Commons. This original expedient seriously alarmed the Government, a Royal Proclamation was obtained declaring the meetings illegal and requiring the punishment of the offenders, and Mr. George Edmonds with three other of the leaders were arrested and received terms of imprisonment. This had the effect of checking the agitation for some years, but still there was no improvement in the condition of the people, and, Parliament being apparently opposed to any measure of reform, Mr. Thomas Attwood, a prominent local gentlemen, formulated the idea of the Birmingham Political Union.

A meeting was convened and held on the 25th January, 1830, when the basis of the desired reforms was discussed and agreed upon. A petition stating the distressing condition of the people was drawn up and signed by 25,000 local men, and the example of the Birmingham people was immediately followed by several other great towns in the country. The hopes of the reformers were stimulated by the accession of William IV., who was known to favour liberal views, and, upon Earl Grey forming his Ministry, Lord John Russell introduced his Reform Bill on the 1st March, 1831. The vicissitudes of this measure and its opposition by the Lords are matters of national history, but eventually the Bill was passed and became law on the 7th June, 1832.

Under its provisions, Birmingham became a parliamentary constituency with two representatives, and Mr. Thomas Attwood and Mr. Joshua Scholefield, the president and vice-president of the Union, were elected the two first members.

By the Reform Act, 1867, the number was increased to three, and by the Redistribution of Seats Act, 1885, to

seven, the number of members the city returns to Parliament at the present time.

Great hopes were entertained of the reformed Parliament, but, as the privations of the people remained unrelieved, a few years later saw another rising of the populace, this time in support of the Chartist movement. Large assembles met in the Bull Ring, and deplorable rioting and damage to property took place, which necessitated the introduction of a military force to subdue it.

That progressive spirit which induced the Birmingham men to influence parliamentary reform to so great an extent now moved their leaders to consider the expediency of improving the administration of their local affairs. Satisfied for the time being with the attainment of their political rights, they now turned their attention to the government of the town itself. The high and low bailiffs, representatives of the lord of the manor, still existed, the county magistrates administered justice, and the lighting, paving, and sewering of the town was dealt with by the Street Commissioners.

No immediate movement was made, however, as the Government was known to be considering a measure for improving the law relating to all the corporations in the country, and it was thought probable that, in dealing with this question, they would at the same time deal with the government of all the great towns.

Apart from the larger question, Lord Brougham had introduced a Bill for the incorporation of Birmingham among other places, in 1833, but it was withdrawn. Lord John Russell, in 1835, brought in his Municipal Corporations Bill which, after meeting considerable opposition, received the Royal Assent and became law on the 15th September of that year. This measure, however,

while regulating the law relating to the existing corporations, did not affect the large centres of population which were not then incorporated towns, but merely empowered the Crown to grant charters upon the petition of the inhabitants. No active step was taken by the people of Birmingham until 1837, but on the 1st of March in that year Mr. P. H. Muntz convened a meeting "to make the necessary arrangements for obtaining an "incorporation of the borough." The meeting expressed its approval, and appointed a committee to do what was required. Eventually a petition for a charter was presented, but the proposal met with vigorous opposition from a section of the community, who apparently recognised its necessity, but did not like the government by representation it involved. Ultimately the Privy Council recommended the Queen to grant the charter, which was duly sealed on the 31st October, 1838. The borough was divided into 13 wards, and the newly constituted Town Council consisted of 48 councillors and 16 aldermen.

Mr. William Scholefield became the first Mayor and Mr. William Redfern the first Town Clerk, both gentlemen having rendered eminent services in promoting the charter.

A separate Commission of the Peace was granted early in the following year, and 25 magistrates appointed. The Corporation next turned its attention to obtaining a separate grant of Quarter Sessions, petitioned the Crown for this purpose, and on the 7th May, 1839, the Mayor informed the Council that their object had been attained.

Mr. Matthew Davenport Hill became the first Recorder and Mr. George Edmonds was appointed the first Clerk of the Peace.

One of the earliest acts of the Town Council was to consider the establishment of an adequate police force for the preservation of good order in the borough, but they were embarrassed by the want of the necessary funds. The Bull Ring riots having emphasised the necessity of such a provision, Parliament was approached to assist by advancing the required moneys. The project immediately aroused the hostility of the opponents of the charter, and the Government took the unexpected course of passing an Act of Parliament appointing a chief commissioner of police for the borough, a proceeding which naturally aroused the indignation of the Town Council.

The validity of the charter and the power to levy a rate were questioned, but eventually, by a Police Act and the Charters Confirmation Act, 1842, the charter was confirmed and all questions were set at rest. A Watch Committee was appointed, and the control of the police properly passed into the hands of the Council. The Corporation had, however, but limited control over the administration of the affairs of the town.

The Street Commissioners still exercised their jurisdiction and levied their rate, but in 1851, by the Birmingham Improvement Act of that year, their powers were transferred to the Corporation, who then obtained control over the whole government of the borough.

From this time onward the history of the town, with a few exceptions, mainly centres round the work of the people's representatives in the Town Council, but, before referring to the important occurrences of the latter part of the nineteenth century, it is interesting to observe the growth of the town during the earlier part of that period. It has been remarked that at the commencement of the century the inhabitants numbered 73,670 persons, while

at the census in 1870 they were returned at 343,000, thus it had quadrupled its population, become a parliamentary borough and an incorporated town.

Among its industries during this period, the introduction of the steel pen manufacture and electro-plating form the most important additions to its commerce.

Passing now to the latter part of the century we arrive at a period during which Birmingham made great advances upon its progressive way. The year 1870 saw the advent of Mr. Joseph Chamberlain to the City Council, and under the influence of his personality the town began to earn that reputation for forward policy, sound administration and good government, which it has since acquired and we trust will ever maintain. Three years later he became Mayor, and at his instigation the gas and water supplies of the city, which had hitherto been in the hands of public companies, were municipalised. The undertakings were acquired from the different companies, and this politic act has since been amply justified, the gas department now annually relieving the rates by an amount of about £50,000.

But Mr. Chamberlain's energies did not rest here. The continuous and rapid increase in the number of the inhabitants, combined with the lack of proper control over the erection of buildings, had resulted in a large, undesirable and insanitary area in the centre of the town.

Mr. Chamberlain proposed to acquire practically the whole of this area under the powers of the Artizans' Dwellings Act, 1875, and to cut a broad thoroughfare from New Street to Aston Road.

The scheme was adopted by the Council and has since been entirely carried out. Corporation Street and some of the finest business houses in the city now stand on the site of the former slums.

The area acquired was 45 acres, and the total cost in round figures £1,700,000.

The difficulty of dealing with the sewage of the town was at this period becoming a problem which the Council felt they must endeavour to solve, and accordingly in 1876, acting under the powers conferred by the Public Health Act of the previous year, a joint board was formed consisting of Birmingham and several of the surrounding districts.

The Birmingham, Tame and Rea District Drainage Board now operates a large area of land consisting of about 2,830 acres. It deals with the sewage both by broad irrigation and by bacteriological treatment, and the farm forms perhaps the most efficient sewage disposal works in the country. The total capital expenditure to date is £1,148,000, and the Board deals with a dry weather flow of 25,000,000 gallons of sewage daily. The constitution of the Board consists of two ex-officio and 20 elective members, the Corporation of Birmingham having one ex-officio and 12 elective representatives.

Since obtaining what has been described as the Second Charter of the town, the Birmingham Improvement Act, 1851, the Town Council had, from time to time as circumstances demanded, procured a long series of Acts of Parliament regulating the different matters falling within the scope of their administration.

These various measures becoming in the course of years so numerous, it was considered that a rearrangement and codification would be desirable. Mr. Edward Orford Smith, the present Town Clerk of Birmingham, who was appointed to that office in August, 1881, immediately considered the whole of the local legislation, and presented an exhaustive report upon the subject, which resulted in the Birmingham Corporation (Consolidation) Act, 1883,

by which, with a few exceptions not expedient to be dealt with by that Act, the whole of the local law was codified, brought up to date and arranged in a convenient form.

In the following year Birmingham attained one more important step in the development of its local administration. The authorities had long sought to obtain a grant of assize, but so far their efforts had been unsuccessful.

The Home Office recognised the expediency of constituting Birmingham an assize town, but stated as their reason for withholding the grant that no adequate courts or judges' lodgings were provided.

However, on the 1st July, 1884, the Council were informed that an Order in Council constituting the borough an assize town would be made, and accordingly, on the 1st August following the first Birmingham Assizes were opened by Baron Huddleston and Mr. Justice Wills, the latter a native of the town and a son of a former magistrate and alderman of the borough.

It was intimated upon the grant of assize being made, that proper courts must be provided, and the Town Council renewed their efforts towards making suitable accommodation for the purpose. Several previous schemes had been considered with a view to providing a site near the Town Hall, but on the 3rd August, 1880, the Council rescinded all its previous resolutions to that effect and directed a site to be retained in Corporation Street, upon the improvement area.

It was decided to institute a competition for designs, and the successful architects were Mr. (now Sir Aston) Webb and Mr. Ingress Bell of Westminster.

The erection of the courts was commenced, and on the 23rd March, 1887, Her late Majesty Queen Victoria laid the foundation stone.

The courts took four years to complete, and were opened by Their Majesties our present King and Queen, then the Prince and Princess of Wales, on the 21st July, 1891.

The courts were first used on the 30th of the same month, and the first judges to hold an assize there were the late Lord Chief Justice Coleridge and Mr. Justice Wills.

The Victoria Courts form one of the most beautiful and artistic buildings in the city, and must be seen to be appreciated. They comprise accommodation for the assize courts and the quarter sessions, the police courts and the coroner's court, with suitable retiring rooms and a fine library for the use of the bar. The total cost returned to the Council on the 6th December, 1892, was £113,352.

The Town Council attained the completion of the first 50 years of its existence on the 26th December, 1888, and signalised the occasion by granting the freedom of the borough to Mr. P. H. Muntz, the gentleman who had taken so prominent a part in the promotion and acquisition of the Charter of Incorporation in 1838. Further, under the Local Government Act, 1888, the town became a county borough, and on the 4th December of that year the Council petitioned Her late Majesty to confer the title of city. Their request was promptly acceded to, and the Letters Patent issued on the 14th January of the following year. At this time the civic authorities were endeavouring to carry through a scheme for the extension of the borough boundaries. The rapid growth of the outlying districts, the inconvenience of small local governing bodies exercising jurisdiction over areas immediately adjoining the district within which the Town Council held control, combined with the fact

that the town, considered as a centre of population, had long outgrown the limits of the borough, induced the Town Council to bring forward a greater Birmingham scheme, under which the boundaries of the city would have embraced practically all the outlying districts which are immediately contiguous. This scheme, however, was destined to be unsuccessful, and ultimately the extension of the boundary was limited to the area embraced by the parliamentary borough under the Redistribution of Seats Act, 1885, and the city, with the additional area added by the Extension Order, 1891, now comprises 12,639 acres.

The number of wards was increased to 18, and the members of the Council to 18 aldermen and 54 councillors.

The Corporation at this time had in contemplation, and shortly afterwards commenced, the greatest and most important of its municipal schemes.

Prior to the acquisition of the water company's undertaking before touched upon, the Council had seriously considered the important question of the water supply of the town, and the Public Works Committee instructed Sir Robert Rawlinson (then Mr. Rawlinson) to advise them upon the subject.

In April, 1871, he presented an exhaustive report, in which he called attention to the gathering grounds of the rivers Elan and Claerwen in Mid Wales.

He suggested that water should be brought from this source to the town by conduit, and although no steps were taken at the time to carry his proposal into practical effect, 21 years later the Corporation applied to Parliament for power to enter upon one of the most stupendous engineering schemes ever undertaken.

The main Elan Valley Supply works constructed to date consist of three impounding reservoirs in Wales, from

which the water is led through the Foel Tunnel, entering at a point 770 feet above O.D., to rough filter beds situate below the lowest dam on the Elan. Thence it is conducted through an aqueduct about 75 miles in length (traversing the counties of Radnor, Hereford, Salop, Stafford, and Worcester) to a large receiving reservoir at Frankey, about 7 miles from the city, at a point 600 feet above O.D. From this the water is passed through sand filter beds into distributing pipes, and so into the general distribution system of the city and district.

The watershed acquired covers an area of 45,562 acres, *i.e.* over 71 square miles.

The reservoirs before mentioned (all on the Elan) have the following approximate capacities:

Craig-yr-allt-Goch, 2,000 million gallons; Pen-y-gareg, 1,300 million gallons; Caban Coch, 7,800 million gallons.

The lower portion of the Dol-y-Mynach dam (on the Claerwen) and the Dol-y-Mynach tunnel have also been finished.

The inlet to the Foel Tunnel is placed in the Caban Coch Reservoir on the upstream side of what is known as the "Submerged Dam" at Careg-ddu. The reservoir below this dam is reserved for compensation water, the Corporation being under statutory obligation to send 27 million gallons of water per diem down the River Elan.

The aqueduct consists of "tunnel," "cut-and-cover," and "pipes," the first two classes of work being constructed of sufficient capacity for the ultimate yield to Birmingham of the Welsh gathering ground, *i.e.* about 75 million gallons per diem.

The latter class of work (pipes) is at present laid in two lines only (out of an ultimate six lines). The two lines convey about 25 million gallons a day.

The Elan Valley Works were opened by His Majesty the King on the 21st of July, 1904, and the cost to date may be roughly put at 5½ millions sterling.

Birmingham had long been numbered among England's great towns, and, as a fitting recognition of its dignity and importance, Her late Majesty Queen Victoria, on the 3rd June, 1896, by Letters Patent under the Great Seal, granted the title of Lord Mayor to its Chief Magistrate, and by Act of Parliament in the year 1903 the style of its civic representatives was altered to correspond.

The Council now entered upon a new sphere of activity in the direction of municipal enterprise. Under powers conferred by an Act of Parliament in 1889, electric light in the city was supplied by a private association known as the Birmingham Electric Supply Company. Their area did not include the whole of the city, and the Corporation had already considered the expediency of a municipal supply, but with characteristic caution abstained from taking any practical steps until the commercial prosperity of the company was proved. The success of the existing undertaking was soon assured, and on the 14th June, 1898, the Council approved terms for its acquisition by the Corporation.

An Act of Parliament was promoted in the following year to enable the city to acquire and work the undertaking, which was subsequently purchased by the Corporation for £420,000.

The area of the municipal supply was extended to embrace the whole of the city, and the Council have since largely increased the plant and generating power. A large station for this purpose is now in course of construction and is nearing completion. The total capital expenditure up to date is £815,800, and arrangements

have been made for considerable further capital outlay for the provision of sub-stations and general extensions of the undertaking.

To leave the Corporation and its municipal schemes for a while, we may now turn to another momentous advance in the history of the town. Adequate means for scientific instruction and higher education are matters of great importance in every large centre of population. The Birmingham University was founded by Royal Charter in 1900, and has for its first Chancellor the Right Honourable Joseph Chamberlain. It grew out of the Science College founded and endowed by the late Sir Josiah Mason, Knight, with which had been amalgamated the Medical Faculty of Queen's College. The latter foundation owed it origin to Mr. Sands Cox, a Birmingham surgeon who was the father of medical education, and indeed perhaps of higher education of all kinds, in Birmingham, for although Queen's College in its later years contained only a Medical School and a Theological Training Department of the Church of England, it started with a much wider programme, and at one time possessed a full staff of professors in arts, science, divinity, law, and medicine. The present position of the University is largely owing to the incomparable help it has received from Mr. Chamberlain, through whose influence a sum of money exceeding a quarter of a million has been raised for university purposes. The new University buildings now being erected at Bournbrook, which it is hoped will be opened during the present summer, will accommodate many of the new departments, the old building in Edmund Street being reserved for the Arts and Medical Faculties. The University receives the support of the Corporation, which gives an annual grant equal to a

½*d.* rate, amounting to about £6,000 each year, towards its maintenance. Although the Medical Faculty is still the largest department, great efforts are being made to supply superior education in subjects of special interest to an industrial community like that of Birmingham, and it is hoped that the Faculty of Commerce and the departments of Engineering, Mining, and Brewing will do much to forward their related industries, by the better scientific instruction of youths destined to these employments.

To return to the Corporation, we now find that energetic body entering upon their latest municipal enterprise and deciding to control the tramways in the city, and to operate them as a public undertaking.

Hitherto the tramways had been constructed under powers conferred by various Acts of Parliament and Provisional Orders. They were worked by different public companies, who held the lines under leases from the Corporation.

The policy of leasing the tramways was, in the light of experience, considered doubtful. The lessee had but a terminable interest, and it was naturally difficult to induce the adoption of modern improvements when the innovation would involve any considerable expense. The terms of some of the leases were shortly approaching their expiration, and the City Council, who had sometime previously resolved upon municipalisation, promoted and obtained an Act of Parliament in 1903 to enable them to work the tramways in the city upon the termination of the existing leases. The Act repeals the previous Acts and Orders, and provides a new code of legislation governing the subject. In the last session of Parliament the Corporation obtained a further Act, whereby they are empowered to largely extend the system, and, together

with the existing tramways, to operate about 63 miles of line within the city. The tramway question in Birmingham has been surrounded with difficulties, but under the able chairmanship of Mr. Charles Gabriel Beale the Corporation are making rapid improvements, and the enterprise promises to become one of the most successful of the city's undertakings.

Leaving secular matters, an event of paramount importance to Birmingham Churchmen now claims our attention. Hitherto the city, for ecclesiastical purposes, was included partly in the diocese of Worcester and partly in the diocese of Lichfield, but for some fifteen years the constitution of a separate See for the city had been contemplated by leading local Churchmen, whose endeavours in this direction were destined to be ultimately successful. It was found that £100,000 would be required for an endowment, in addition to a house. Eventually, owing to the generous spirit in which the proposal was met, a sum of money greater than the amount thought to be required was given or promised, the Birmingham Bishopric Act was passed in August, 1904, and the Birmingham See became an accomplished fact.

The See was offered by His Majesty to Dr. Gore, the former Bishop of Worcester, who had taken an active part in the promotion of the scheme. The offer was accepted, and Dr. Gore was translated to Birmingham, and enthroned in the newly constituted cathedral church of St. Philip on the 2nd of March, 1905.

Birmingham contains many public institutions, educational and philanthropic. Space will not permit even a brief reference, but it may be of interest to call attention to a few of the principal public buildings which have not been previously touched upon.

The Town Hall was built in 1832 from designs by Messrs. Hanson and Welch. The style is Corinthian, and the building forms a leading architectural feature of the city.

It is faced with Anglesea marble, and includes a great hall 150 feet long by 65 feet wide, with seating capacity for 2,300 people. The hall contains a magnificent organ belonging to the General Hospital. The Triennial Festivals are held here, and the building is generally used for concerts, public meetings, and similar gatherings.

The Council House, the most conspicuous building in the city, is the home of the civic government. It was built from designs by Mr. H. R. Yeovil Thomason and completed in 1879. The building contains a handsome banqueting hall and large reception rooms, with a fine council chamber, and convenient rooms for the use of the various committees. The rest of the building is devoted to suitable offices for the different administrative departments of the Corporation. The great increase in the work of the City Council and the development of its various enterprises have rendered the provision of additional accommodation necessary. The Council, to meet the demand, have decided to erect an extensive annexe at the rear of the present building upon a site acquired for that purpose some years ago.

Designs are at present under consideration, and the new building when completed will no doubt form an important addition to the architecture of the city. A considerable part of the new annexe will be devoted to extending the present Art Gallery, which forms practically part of the Council House building.

The Art Gallery was completed in 1885, and opened by His Majesty the King (then the Prince of Wales) on

the 28th November in that year. It contains a large collection of works of art, and has been the recipient of many valuable gifts from Birmingham's leading citizens.

The Midland Institute, a fine building fronting Paradise Street, is one of the city's foremost organisations. The present site was granted by the Corporation, and the building was designed by Mr. E. M. Barry, and commenced in 1855. The foundation stone was laid by the late Prince Consort on the 22nd November in that year, and the building was completed and opened in October, 1857.

It carries on a course of instruction in art, science, literature, and music, and forms one of the principal educational institutions in the city.

The Free Library is a municipal institution carried on by the Corporation under the Free Libraries Act. It forms one block with the Midland Institute, and was completed in 1865. The Reference Department includes 181,823 volumes.

One of its chief features is a Shakespeare Memorial Library, containing a collection of all the known editions of Shakespeare's works, ranging from the original quartos to the cheapest editions. There are also nine branch libraries in different parts of the city, having, together with the central library, 115,645 volumes available for circulation among the citizens.

King Edward's School, founded, as we have seen, by King Edward VI. by a restoration of the funds of the Guild of the Holy Cross, was erected from designs by Mr. (afterwards Sir Charles) Barry, who subsequently designed the Houses of Parliament. The present building occupies the site of the former school, and forms the principal architectural feature of New Street.

We have now taken a hasty survey of some of the principal events which, like milestones upon her progressive road, mark the advance of Birmingham. From the hamlet to the village community, from the village community to the country town, and from the country town to the populous city, we find her to-day, in the early years of the 20th century, the metropolis of the Midlands and one of four of England's greatest provincial towns. The centre of a large and populous district, she embraces within her own boundaries a population of 543,000 inhabitants, the results of whose industry find a market throughout the world.

A glance at her local history, however, illustrates that the records of her principal citizens form the chief factor in her success and development.

A Birmingham man has been described as "of strong "individuality, independence of character, facility of "resource, and with an enduring love for the old town.' The city has not attained her present wealth, dignity, and importance except by the efforts of her leading men.

May their achievements provoke the emulation of future generations, and may we conclude with the hope that, as Birmingham men are proud of their city, the city will ever have reason to be proud of her men.

Mr. G. LANGRIDGE (Vice-President) said it gave him great pleasure to propose a vote of thanks to Mr. Pritchard for his Paper. As Members of The Institution would know, Birmingham had earned for itself an honoured name as prominent among the towns which led the way, and those who had heard the Paper, or who would read it afterwards, would gather from it much valuable informatoin as to the growth and inner life of the City.

Beginning with it as a small village, mentioned in the Doomsday Book, the author had brought its history down to 1327, when it became a corporate town, from which it had grown to the great city of to-day. It was interesting to observe how carefully the town affairs were first arranged. Mr. Pritchard had told how its first officials appointed were a bellman, a midwife, and an organist. He thought the bellman might be taken as representative of Tubal Cain and the forerunner of those artificers in metal who contributed so largely in laying the foundation of Birmingham's fortune, as it was to that industry that Birmingham mainly owed the prosperity that it enjoyed to-day. The organist, of whom Mr. Pritchard spoke, might be taken as representative of the arts and sciences which had always gone hand in hand with Birmingham's commercial prosperity. As Birmingham flourished as a town so it had encouraged the arts. The inhabitants had not confined themselves simply to making money, but had with that money done good to their town and to the nation. He need not do more than refer to the third party mentioned. When she began her duties somewhere about 1327 there were 75 capitalists possessing goods of the value of 10*s.* and upwards, but now she had 560,000 people to look after.

He thought he might well say that the fathers of Birmingham could not have better inaugurated the Corporation than as described in Mr. Pritchard's admirable Paper, which has a special value as showing what could be done by a town which put its whole heart and soul into its work.

Mr. PETER ADDIE (Fellow) said he had very great pleasure in seconding the vote of thanks to Mr. Pritchard

for his Paper, the writing of which must have taken a very great deal of time and involved a vast amount of research. There was one matter to which he would like to call attention, and that was the continuity of the enterprise of Birmingham. Among the monuments mentioned, one of the greatest was the Corporation Street scheme, which was adopted under the Artizans' Dwellings Act. The scheme cost about £1,700,000, and he ventured to guess that at the present time it was worth between three and four million pounds. It was a very good investment from the municipal point of view, and showed wonderful foresight on the part of the City Fathers thirty-five years ago.

The vote of thanks was then put to the Meeting and carried unanimously.

PAPER 322.
No. 500.

SECOND PAPER.

# ON THE ECONOMIC GEOLOGY OF THE BIRMINGHAM COUNTRY.

BY PROFESSOR C. LAPWORTH, F.R.S., BIRMINGHAM UNIVERSITY.

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The citizens of Birmingham naturally hold their town to be the capital of the Midlands, and apply the title "Birmingham District" to all the ground covered by the Midland Counties. But for our present purpose it will be most convenient to restrict our view to that central part of the Midlands which lies within a radius of 10 miles of the city, and term this area, for the time being, the Birmingham Country.

The solid floor of this Birmingham Country, like that of every other extended area in Britain, is formed by the edges of the massive rock-sheets that constitute the so-called geological formations. Omitting, for the sake of simplicity, the complicated little area of the Lickey Hills, we have here some seven of these formations. Commencing with the highest and newest, and

ending with the deepest and oldest, we find them arranged one below the other in the following order:

7. The Keuper Marl (600-800 feet in thickness).
6. The Keuper Sandstone (200-400 feet).
5. The Bunter Sandstone (300-400 feet).
4. The Bunter Pebble Bed (200-500 feet).
3. The Permian (500-600 feet).
2. The Coal Measures (1,000-1,500 feet).
1. The Silurian (2,000-3,000 feet).

If these seven rock-sheets had remained horizontal, as they were originally deposited, the strata of the highest formation, namely those of the Keuper Marl, would have constituted the whole of the solid floor of the Birmingham Country, which would everywhere have formed a gently undulating lowland, like the Central Warwickshire of to-day. The mineral riches of the coal and iron beds of our South Staffordshire Coalfield would have remained undiscovered, buried half a mile deep below the surface of the ground. This Birmingham Country of ours, instead of being what it is at present, a land remarkably varied in its scenery and its productions, inhabited by a teeming manufacturing and mining population, collected in great towns and in the van of industry and progress, might have been a monotonous agricultural region, with a scanty population gathered here and there into quiet little villages—a country peaceful and picturesque, it may be, but without progress and almost without a history.

But, providentially, the great rock-sheets have not remained horizontal. They have been bent up in the western parts of the Birmingham Country into the dome-like form which we term the Staffordshire arch, and

warped down in the eastern parts into the basin-like form which we call the Warwickshire trough. They have been broken across and dislocated by the two great crust fractures, which we know as the western and eastern boundary faults of the South Staffordshire Coalfield, and also by a third great fracture, the Birmingham fault, which runs through the city itself.

Yet notwithstanding these movements and dislocations, it is doubtful if the surface of the Birmingham Country has ever shown much greater elevation, or more contrasted relief, than it does at the present day. For, as the formations slowly lifted themselves upwards, their exposed edges became worn across and washed away by the action of the sea, the rain, and the rivers, to the same general surface level; a level, however, varied by much surface relief, since the rocks of the softer formations—the shales and the clays—would at every stage be soon worn down into plains and valleys, while those of the more resistant formations—the sandstone, the pebble beds, and the limestones—would long remain relatively undenuded, standing above the level of the rest, as hills or high ground.

As the result of this movement and denudation we now find that, where the formations have been most elevated, namely, in the central parts of the Staffordshire arch near Dudley, they have all been denuded away down to the oldest formation itself, the Silurian, which is there laid bare at the surface. Only in the heart of the Warwickshire trough, near Knowle and Solihull, have we the newest formation, the Keuper Marl, left wholly undenuded. As we pass over the country from Dudley through Birmingham to Knowle, we cross the outcropping edges of the various formations in their natural order from the lowest to the highest. The outcrops of

the successive rock-sheets form a series of roughly parallel and curving bands ranging through the Birmingham Country. These bands vary in width according to the relative thickness or steepness of the rock-sheets which form them, and the scenery and economics of each band is marked by special peculiarities of its own. In the western half of the Birmingham Country the bands bend to the southward, dipping away from the crest of the Staffordshire arch; in the eastern half they dip towards the heart of the Warwickshire basin. The symmetry is broken by the great faults and by smaller fractures, but on the whole the arrangement is simple and clear.

The oldest and deepest formation of the Birmingham area—namely the *Silurian*—is, as we have already pointed out, laid bare at the surface in the heart of the Black Country. It rises out from below the Coal Measures of South Staffordshire to form the finely wooded hills of Dudley Castle and the Wren's Nest. The main mass of this Silurian formation consists of soft shales of no economic value; but interbedded with these shales is a double band of limestone—the Wenlock Limestone. The two Dudley Hills have been mined for generations for this limestone, which has been utilised as a flux for the iron ores of the surrounding coalfield; and both hills are honeycombed by a labyrinth of caverns and hollows from which the limestone has been extracted. The same limestone is again met with near Walsall, where it has also been completely worked out, and there can be little doubt that it extends far under the Coal Measures themselves, but too deep below the surface to pay for mining.

Circling round and above the Dudley Silurian comes the wide spread of the *Coal Measure formation*, which

floors the surrounding district of the Black Country. This Coal Measure formation is made up of more than 1,000 feet of soft clays, sandstones, and fire-clays, coal seams and beds of ironstone. In its lower half occur the more valuable workable coal beds of the district—the Bottom Coal, the New Mine Coal, and also the famous Thick Coal (the ten-yard or thirty-foot seam), the finest seam of the Black Country, and, in its day, of all Britain. Most of these South Staffordshire coals and their associated ironstones are now largely worked out in the southern part of the Black Country, up to its eastern and western boundary faults. But beyond these faults, they are continued deep under the red rocks far outside its borders, and may possibly, in the distant future, be proved to extend, with interruptions, to the Warwickshire Coalfield in the one direction, and to the Coalbrookdale Coalfield in the other. At present they are mined below the red rocks only outside the eastern boundary fault, in the deep collieries of Sandwell and Hampstead, north of Birmingham. They have, been however, successfully proved outside the western boundary fault below the Permian of Baggeridge, where extended colliery operations will soon be carried on.

Although the thickest coal seams are largely worked out in the Black Country, other strata of high commercial value are still widely exploited. The fire-clays are worked for the manufacture of pottery at Stourbridge; and, the Coal Measure brick clays, which follow above the Thick Coal series, and which are of great thickness and cover a large area in the Black Country, are quarried in numberless excavations and burnt into the famous Staffordshire blue brick, which is utilised everywhere by civil engineers and builders when colour is

of little consequence but strength and permanence are all important.

Indeed, from the economic point of view, the Coal Measure formation has proved itself to be the richest in the Birmingham Country. Its strata have not only brought wealth to the landowners to whom they belonged, but they have provided a constant and reliable means of livelihood for many generations past to the abundant mining and manufacturing population which has exploited them. Even at the present day, though the mining output of the Birmingham division of the coalfield has become relatively small compared with that in the northern division, this southern part of the Black Country is still a most populous and thriving district. It is a growing maze of towns, villages, hamlets, mines, and manufactories, all united by a network of railways, canals, and tramlines, and is infinitely more prosperous and progressive than it looks.

Its scenery is by no means attractive. Its floor of easily disintegrated rocks has been worn away by the weather into an uneven plain, relieved only by pit mounds, heaps of slag and cinders. Occasionally, however, the ground rises into respectable hills, as in the neighbourhood of Rowley, where a volcanic rock, the Rowley Rag, stands up hard and stubborn, and is worked in many quarries, for it constitutes one of the best road metals in the district. Again there is much high ground to the south of Rowley, in the country extending from Halesowen to Stourbridge, where the strata which form the upper parts of the Coal Measures set in. These are thick-bedded grey sandstones, comparatively soft and of no great economic value, but they are harder and more resistant than the

Brick Clay series below and give rise to relatively varied and well-wooded scenery.

Rich as their lower beds have proved in materials of commercial value, most of the strata of the Coal Measure formation of South Staffordshire suffer from one great economic defect. They are poor in underground water, and the water supply for the population of the Black Country is mainly obtained from the water-bearing sandstones of the surrounding districts.

Succeeding at once to the comparatively soft black and grey rock formation of the Coal Measures of the Black Country, comes the relatively hard red sandstone and breccia formation usually known as the *Permian*. The band of country occupied by the outcrop of this formation forms a range of high grounds, sweeping like a semicircular framework of hills all round the outer edge of the southern half of the Coalfield. These Permian hills are of but little importance to the east of the Coalfield, near Smethwick; but, to the south-west, the hills gain in breadth and rise in height, constituting the ranges of the Upper Lickeys and the Clents, which sweep upwards at Walton Hill and near Hagley to elevations of from 900 to more than 1,000 feet, and form the highest ground in the Birmingham Country.

The lower and inner half of this Permian band—that nearest the Coalfield—is made up of hard red sandstones, firm enough to form a fair building stone, and generally containing good (but hard) water available for cottages and farms, and in some cases sufficient for the wants of large breweries. The upper and outer half of the Permian band, however, contains but few sandstones, and is mainly composed of breccias—rubble-like rocks, made up of angular stone chips and blocks—interspersed with sand; so loose and open that the rain

water soaks through almost as fast as it falls. The soil above is consequently thin and poor, and the highest Permian ground is best fitted for sheep pasture, as in the case of the uplands of Clent.

Above the Permian follows the geological formation known as the *Bunter Pebble Beds.* This lies on the outer side of the Permian Hills, and usually constitutes their eastern and southern slopes. It is made up of layers of pebbles and gravel set in a paste of loose sand. It has a thickness of from 200 to 500 feet, and as a rule contains an abundance of underground water. Sometimes the band of country floored by these pebble beds is a couple of miles in width, as for example north-west of Sutton Coalfield. Sometimes it narrows almost to disappearance, as near Selly Oak. The land it forms is usally poor and comparatively barren, its pebbly soil rendering it intractable of cultivation. Where it forms fairly steep slopes, as on the western flanks of the Lickey Hills, south of Birmingham, and the underground waters can drain away, the rock-sheet forms fair agricultural land, and of late years some of it has been settled upon in villa residences and the like. But where the formation spreads out more or less flat, as to the north of Birmingham, it forms wild uncultivated tracts of country. Perhaps the best example of this is Sutton Park—a picturesque maze of rough woodlands of holly and dwarf oaks, broad stretches of brown heath, and abundant dark waterpools—one of the last unconquered survivals of the old forests of the Midlands.

To the ground occupied by the Pebble beds there succeeds a narrow band of lower ground floored by the rocks of the overlying formation—the *Bunter Sandstone.* This is a red sandstone, often mottled and variegated

with white or green bands and streaks, and with so fine and regular a grain that it has been employed for generations as a moulding sand for casting purposes It follows the pebble bed formation all along its course from Sutton Coldfield through Western Birmingham and round the Lickeys to the southern slopes of the Clents. It is marvellously rich in sweet underground water. Many of the deep-water wells of the original Birmingham Water Supply, the South Staffordshire Water Company, and the East Worcestershire Company are sunk, in this band. Its soil, where not hidden by drift, is excellent.

Only two more rock formations remain for notice—the *Keuper Sandstone* and the *Keuper Marl.* These two formations are best described together, not only because of their intimate relationships, but also because of their striking contrasts.

The Keuper Sandstone is a hard and resistant rock-sheet, and the band of country which it forms constitutes a fairly continuous tract of higher ground, averaging about a mile in width, and ranging through the Birmingham Country from Sutton Coldfield through Erdington, Central Birmingham, Edgbaston, and Northfield to Bromsgrove, and thence towards the Severn beyond Hagley. This sandstone band affords a fairly good building stone, of which many of the older Midland towns, churches, and castles were built, and which is still worked at Bromsgrove and elsewhere. Along the whole extent of this Keuper Sandstone band the rocks afford underground water, and, where not overpumped, yield a constant supply to wells and springs.

In almost all these respects the rocks of the succeeding formation—that of the Keuper Marls—present a striking contrast. These marls are thin-bedded clays or

shales, with intercalated sandy layers and occasional seams of gypsum. They are all comparatively soft, and are easily disintegrated and levelled down by the weather, so that the country which they floor is relatively low. It spreads out from the eastern and southern foot of the Keuper Sandstone ridge far and wide over all the central parts of Warwickshire and Worcestershire. But though low, it is not wholly plain-like, for its surface rises and falls in broad and gentle swells, almost monotonous in their soft undulating beauty. Unlike the hard rocks of the Keuper Sandstone, these soft Keuper Marls are practically dry, for they are usually quite impervious to the rain waters. What little underground water is met with in the thin sandstones intercalated with them is extremely hard; and, broadly speaking, it may be said that the only good wells and springs in the marl country are those occurring in the thin superficial sheet of drift gravel and sand which overspreads it.

These geological contrasts between the two formations of the Keuper Sandstone and the Keuper Marl have had a most vital influence upon the local development of the eastern half of the Birmingham Country. The ground floored by the Keuper Marls remained wild and unenclosed well into the Middle Ages, as the ancient Forest of Arden, and even at the present day it is a sparsely populated land, mainly devoted to agriculture and pasturage. But the amenities of the Keuper Sandstone ground have been always well appreciated from the earliest ages down to the present time. As I have said elsewhere: "The narrow bands of Midland country "floored by the outcrop of these Keuper Sandstones— "rich in springs of good water, relieved by swelling "hills or picturesque scarps, and adorned with a "luxuriant growth of trees—were those which were

"naturally selected by the ancient inhabitants of the "district as the sites of their earliest settlements. "Since the dawn of history they have always remained "the favourite dwelling grounds for the inhabitants "of the Midlands. All the older towns of the district "—Warwick, Coventry, Nuneaton, Tamworth, Broms- "grove, Birmingham, Sutton Coldfield, Lichfield, &c. "—are built upon the outcrops of this formation, and "the favourite suburbs of these towns also lie along its "outcrop—Edgbaston, Erdington, Tettenhall, Stour- "bridge. Not only do we find upon it most of the "mansions of the older nobility, such as Witley, Himley, "Hagley, Hewell, &c., but it is marked by the newer "country or suburban villas and grounds belonging to "those whose wealth enables them to satisfy their natural "craving for a home for themselves in the healthiest and "most picturesque parts of the district."

In this connection it is interesting to note how the original site of Birmingham itself was fixed at that spot where the Birmingham fault makes the economic contrast between the two Keuper formations most sudden and conspicuous; and it would be instructive to dwell upon those geological causes which, acting on a still larger economic scale, have since contributed to her progress and prosperity. But we have only time, in conclusion, for a brief glance at the surface deposits of the Birmingham country.

The chief of these superficial deposits is the so-called *Glacial Drift.* This overspreads the solid rocks of the district like a universal mantle. It lies as a relatively thin sheet, varying from a few inches to several feet in thickness, almost everywhere between the solid rocks and the soil. It is composed of the heterogeneous materials which were worn off the rock formations, and

moved forward in a south and south-west direction by the ice sheets, glaciers and rivers of the last Ice Age. Occasionally it is a dense clay filled with pebbles, but as a rule it is more or less gravelly or sandy in its nature. On the whole, its presence has been beneficial to the land of the Birmingham Country. It has locally covered up the damp and barren clays of the Coal Measures with drier and more open sub-soils capable of cultivation. It spreads out in cultivable pebbly ridges in the rolling grounds of Edgbaston and Harborne, and in the Bournbrook country where the new University buildings are now in course of erection. It forms the capping of many of the gently rising grounds lying to the south-east of the city, upon which the pleasant suburbs of Moseley, King's Heath, King's Norton, and Solihull are built. Growing less clayey as we follow it mile by mile to the southward, it buries the tough and waterless clays and marls of Central Warwickshire under a covering of looser material—sometimes nearly all gravel, as south of Moseley, sometimes nearly all sand, as in the directions of Solihull and Redditch, but relieving what might otherwise have been a monotonous plain with soft elevations, affording admirable sites for villages and residences. And more, owing to the sandy and open nature of this superficial covering of drift, the water which falls in rainy weather, instead of hurrying off at once to the nearest stream, or stagnating in flats floored by the impervious marls, percolates slowly through the soil into the drift sheet, and is there retained in sufficient quantity to nourish that abundant vegetation which makes Central Warwickshire one of the most picturesque agricultural districts in the Midlands.

Mr. A. VERNON (Past-President), in moving a hearty

vote of thanks to Professor Lapworth for his Paper, said he could not help thinking there was something like artistic completeness about the programme which had been laid before the Meeting. The civic eminence of Birmingham had been represented by the presence of the Lord Mayor, who had given such a hearty welcome to the City; then, in an admirable Paper, the Deputy Town Clerk had given an interesting record of its rise and progress; and now the present aspiration of the City in the pursuit of learning was aptly illustrated by the Paper of Professor Lapworth. Surveyors, as a body, were generally concerned most with results and with the achievements of man, and perhaps with the thinner surface of geology. He had even heard surveyors speak in a slighting way of things which lay under the earth and did not yield themselves to scientific measurements, but, as Sidney Smith said, there were even people who would "speak "disrespectfully of the Equator." Even for the learned professor the subject of geology appeared to have a practical interest, for he noticed that he gave us some pieces of advice which surveyors would appreciate. "Do not build," he said, "on the Keuper marl, for it "is bad." "Build, if you can, on Keuper sandstone, "which was selected by the ancient inhabitants of the "district for the sites of their earliest settlements." The whole world had recently had a lesson in geology, and it would be well if those planning new cities were to know more about the interior of the earth, so as to avoid as far as possible troubles like that at Naples, or the awful earthquake and fires at San Francisco.

Birmingham had the reputation for having exploited and adapted itself, with no small advantage, to the discoveries of others. There was now an

instinctive desire among all Birmingham men to adopt the newer line of research and discovery, and one might look to geology under Professor Lapworth to produce discoveries which should outrival the value of platinum, or gold, or even of radium.

Mr. W. D. GILPIN BROWN (Fellow) said that, as chairman of the Warwickshire and Worcestershire Provincial Committee, he felt he owed a debt of gratitude to Professor Lapworth for coming to read so admirable a Paper upon a subject which must appeal to all, and especially to those who were more or less connected with the district to which the Professor's remarks more particularly referred. He knew that Professor Lapworth had innumerable calls upon his time, and wished to assure him how heartily the Members appreciated and thanked him for his presence and for the part he had taken in the proceedings.

The vote of thanks having been put to the Meeting and carried unanimously—

Professor LAPWORTH, in reply, said he was grateful for the kindly attention with which his somewhat lengthy Paper had been listened to, and for the generous way in which the vote of thanks had been proposed and received. Geology was often referred to as a mysterious science, but most of us were geologists without knowing it. In a general kind of way geology was at the basis of everything. When a man selected the water-bearing Keuper sandstone for a site of his house instead of the Keuper marl he was an unconscious geologist for the time being, and he was glad to welcome so many practical geologists to Birmingham on the present occasion.

He had the greatest sympathy with the aims and objects of The Institution, and he congratulated the Members on the remarkable growth of their numbers: he thought The Surveyors' Institution had a great future before it. He believed that the time would soon come when Britain would wake up to the knowledge that she owed almost as much to the wonderful productiveness of her land as to the energy and genius of her people, and nearly as much to the productiveness of the surface of the land as to the valuable minerals in the rocks below that surface.

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No. 501.

THIRD PAPER.

# PROPOSED LEGISLATION AFFECTING REAL ESTATE.

BY JOHN WILLMOT, FELLOW.

In this Paper I will endeavour to give a short epitome of those Bills at present before Parliament which directly affect real property, and are consequently of special interest to the Members of The Institution.

I have not attempted to make an exhaustive examination of any of them, but propose to raise a few points on each, so as to give rise to a discussion which will elicit the views of the Members on the various subjects.

The Bills in question are:—

1. The Land Values Taxation (Scotland) Bill.
2. The Public Health Acts Amendment Bill.
3. The Housing of the Working Classes Act Amendment Bill.
4. The Land Tenure Bill.

## LAND VALUES TAXATION &C. (SCOTLAND) BILL.

I need hardly refer to the great importance of this Bill to all interested in real property, as, although it only

applies to Scotland, it will probably form a precedent which may apply to the rest of the United Kingdom.

The Bill provides for the taxation, for local purposes, of land values in burghs. Under its provisions, every proprietor (which term I believe refers to the person who is in receipt of the rents and profits from the property) is, each year, to make a return to the burgh assessors of the quantity of each separate piece of ground in the burgh belonging to him, and also the annual value of each of such pieces, which is to be calculated at 4 per cent. interest upon the amount that he may fix as a price between a willing seller and a willing buyer. The value of the land for this purpose is to be taken quite apart from the value of any erections, machinery, or other heritable subjects upon it. The assessor is to consider the value supplied by each proprietor, and to then enter in the valuation roll the value so supplied, or such other amount as he shall deem reasonable. In case any difference of opinion arises as to the value of the site, it is to be determined under the procedure of the Lands Valuation (Scotland) Act of 1854.

The Town Council of every burgh may then levy a rate on the amount entered in the valuation roll, such rate not to exceed 2*s.* in the £. The proceeds of the rate are to be allocated *pro rata* to the several accounts in respect of which police and municipal assessments are levied within the burgh.

The Bill exempts all public buildings, hospitals, schools, places of worship, burial grounds, or parks and open spaces enjoyed by the public or by permission of the local authority.

In the case of lessees who hold under a lease of more than 31 years' duration, they are to be entitled to deduct from any rent payable to the superior landlord, the

amount of the rate in the pound upon the rent reserved under the contract of tenancy, and provision is made to meet the cases of improved ground rents, a proportionate reduction being made in such cases. The Bill further provides that all existing contracts, which have been entered into for the purpose of relieving an owner from liability to bear a share of all present and future rates, are to be null and void.

It will be seen, from the above short epitome of the Bill, that the rate on ground values is to be levied alongside of, and in addition to, the existing rates, and that the new rate is to be levied on the capital instead of the income value of the site.

The subject of the taxation of site values is one which has been before the country for some years and has been discussed "ad nauseam." It raises an entirely new principle in the present law of rating, and as the Members of The Institution are aware, several Bills have been already introduced into Parliament dealing with the subject, notably Mr. Trevelyan's Bill, which passed the second reading in 1905.

This Bill provided for an assessment of land values in towns and urban districts, based on 3 per cent. of the selling value of the land, and where such new assessment amounted to more than the present assessment on the annual value of the property, the rate was to be charged upon such larger sum. Mr. Trevelyan's Bill respected existing contracts.

The Bill now under consideration is a most drastic measure, and proposes to tax owners in respect of site values, absolutely without regard to any arrangement that has been made between them and the tenants as to the payment of all present and future rates.

In considering this subject it is, I think, universally

admitted that the value of the site, as well as the structure of the buildings erected upon it, is already fully assessed to the rates. The taxation of site values to an amount equal to a rate of 2*s.* in the £, which, if fully levied, would amount to a tax in favour of the municipality equal to 10 per cent. on the annual value of the site, will fall unfairly upon an owner who has let his land on lease, at a ground rent which represented only a bare return by way of interest on the value of the site at the time the contract was made. It will also in effect amount to a tax on capital outlay, as, in most cases, before an owner can lay out sites for building purposes, he has to incur a large outlay in constructing streets and carrying out other works to make the land suitable for the purpose, and it will constitute a great hardship in cases where ground rents have been purchased, by trustees or others, as an ordinary investment yielding a certain but moderate rate of interest.

It is contended by those who are in favour of this measure that, if the moneys required for carrying out improvements in urban districts were raised by a rate levied on site values, the ordinary rates would be relieved to that extent, but I think it will be found, if a measure to this effect is ever placed on the statute book, that, although the additional revenue is obtained, there will be little or no reduction in the ordinary rates, and, on the other hand, that a new source of municipal revenue may lead to extravagant expenditure by urban authorities.

### The Public Health Acts Amendment Bill.

This Bill, which has been introduced into the House of Lords by Lord Hylton, is to be construed with the Public Health Acts.

By Clause 2, the Bill will apply to "county districts" (which by Section 21 of the Local Government Act of 1894 includes every urban and rural district, whether a borough or not), and will, with a few exceptions, exempt from the operation of certain existing and future by-laws, any building which is situated at a distance from every boundary of the curtilage of not less than 15 feet, or should the height of the building measured to the spring of the roof exceed 15 feet, at a distance at least equal to such height, and is also distant from any other building not less than 30 feet. The clause further provides that a building is not to be excluded from the exemption because it is situate within the prescribed distance of a street, providing no part of such building is within the prescribed distance from the centre of such street, and also that detached dwelling houses shall not be excluded from exemption by reason of being within 30 feet of any other detached building, which may be constructed as stabling or offices to be used in connection with such dwelling house.

In the case of exempted buildings, the site is to be free from animal or vegetable matter, every wall is to be provided with a proper and sufficient damp course, the ground floors of the buildings are to be at least six inches above the surface of the ground, and every habitable room is to be provided with a proper and sufficient window, so constructed that one half at least of the window area shall be capable of being readily opened to its full extent.

The Bill contains provisions to prohibit the occupation of buildings erected contrary to the stipulated requirements. It also gives power to the Local Government Board to disallow by-laws and to substitute others. Where any person is aggrieved by the requirements

of the by-laws or the refusal of the authority to approve any plans submitted for approval in pursuance of any by-law, such person may apply to a court of summary jurisdiction, who may make such orders as they may think fit in the circumstances, including an order requiring the authority to dispense with any requirements or to approve any plan, with or without modifications. An appeal from the order of the court of summary jurisdiction may be made to quarter sessions.

Amendments to the Bill are to be moved in Committee by Lord Carrington on behalf of the Government, to provide that the proposed exemption shall only apply to buildings in rural districts, power being given to the Local Government Board to extend the provisions of the Act to any borough or urban district, on the application of the Council of the borough or district or of ratepayers representing at least one-tenth of the rateable value of the area.

The amendments also propose to omit the provisions of the Bill relative to the sites and the method of construction of the exempted buildings, and to provide that nothing in the Act is to exempt a building from the operation of any by-law, so far as that by-law relates to purposes of health: any question which may arise under this provision to be decided by the Local Government Board.

The question of by-laws in urban and rural districts has been recently dealt with by Mr. A. R. Stenning in the able Paper read at the Ordinary General Meeting of The Institution in January, 1905. Mr. Stenning then set out in detail the amendments that he considered necessary, and specified the buildings which he was of opinion might be exempted from the general operative clauses of the Public Health Act. The distances by which

he considered buildings should be isolated from other buildings, in order to entitle them to exemption, have been adopted in this Bill.

The model by-laws for urban districts, which are now so much in use in rural districts, are, so far as they relate to new buildings, in many instances quite inapplicable and urgently require revision.

A large part of many local government districts, although described as urban for local government purposes, is really rural in character; on the other hand, portions of rural districts are urban in character, and for this reason I am of opinion that building by-laws should be uniform throughout the country, and that it should not be left to the local authorities to adopt urban or rural by-laws as they may think fit.

In considering the revision of by-laws, I think all members of The Institution will agree with me that, in the erection of every dwelling house, due provision should be made to ensure that only such houses are erected as will provide sanitary and wholesome dwellings. This would still be possible, although by-laws were relaxed so as to permit of the use of various kinds of materials in the erection of buildings. I am, however, fully in accord with Mr. Stenning's opinion that the by-laws should prescribe a minimum size and height for rooms and the proportion which the area of the window should bear to the floor space.

The revision of the by-laws throughout the country on the above lines would admit of the erection of cheaper houses, which would naturally tend to an increase in the building of cottages, and in some rural districts would, I believe, be of great assistance in keeping the agricultural population upon the land.

If amendments are made in the existing laws, to

allow of the erection of cheaper dwelling houses, overcrowding, which is at present so great an evil in many urban districts and in some rural districts, would be less likely to take place in the future, as dwelling houses affording the same accommodation and commanding the same rent as they now do, would cost less to erect under less onerous building restrictions.

This reduction in the cost of the building would allow of a greater expenditure on the site, and consequently the acquisition of a larger area, without increasing the cost of the property as a whole or diminishing the return it yields on the capital outlay.

In connection with this question of overcrowding in urban districts the remedy, in my opinion, is to a great extent within the power of the local authorities themselves, and the difficulty can be met by relaxing the by-laws as to the construction of new streets.

The question of by-laws as to new streets is not referred to in this Bill, nor in the Housing of the Working Classes Act Amendment Bill, but it has a most important bearing on the problem of providing cheap dwelling houses and of preventing the creation of congested districts which, before many years have elapsed, will become slums, and in the meantime do not provide healthy and wholesome houses for those who have to reside in them.

The cost of constructing new roads in most urban districts, and in some rural districts, is very high. In this city and in the neighbouring urban districts, it amounts to between £5 and £6 per lineal yard for a road 42 feet in width. The roads have to be constructed in accordance with by-laws, which provide for a total thickness of metal of about 18 inches, with expensive kerbing, guttering, and paving of footpaths. Proper sewers

have also to be provided, which is necessary in any case.

In many instances the roads are laid out purely for the development of an estate for building purposes. Such roads do not now, nor are they likely at any future time to, form means of through communication, and it may be taken that, in such cases, they are not likely to have to bear a heavier load than can be carried in any ordinary cart. The wasteful expenditure that has now to be incurred on such roads greatly increases the cost of developing an estate for building, with the result that, in order to get a reasonable return on the capital invested, it has to be laid out so as to provide the greatest number of building plots, the inevitable result being overcrowding.

If the requirements as to new roads can be modified so as to provide for the construction of a road amply sufficient for the purposes it has to serve, which might quite easily and reasonably be done, I am of opinion that the cost of developing building land might be reduced by not less than 20 per cent., which would allow of a larger area being allotted to each dwelling house, without any corresponding increase of the purchase money or ground rent, and without reducing the return on the capital expended.

In agreeing to the construction of less expensive roads, the local authorities might reasonably stipulate for a certain area of land to be allotted to each house. All that is required is that every case should be dealt with fairly and reasonably on its merits. If this were done, I feel sure that a great step would be taken towards the provision of healthy and wholesome dwelling houses for working men, at a reasonable cost, on the outskirts of the great centres of population

where they are often at the present time so urgently required. But so long as the existing cast-iron rules are applied to the construction of all roads, wholly irrespective of reasonable requirements, so long, in my opinion, will the difficulty of providing cheap and healthy houses for working men in populous districts continue.

The whole question of building by-laws and of by-laws relating to the construction of new streets is a matter which might, with advantage, be dealt with in a Bill, to be introduced by the Government: the provisions of the Bill should apply to both urban and rural districts.

## Housing of the Working Classes Act Amendment Bill.

The object of this Bill is to extend the facilities for the housing of the working classes in rural districts.

The Bill provides for the repeal of Part III. of the Housing of the Working Classes Act of 1890, so far as it refers to rural districts, and substitutes Part I. of the Bill in place of it.

The effect of this alteration in the law will be to enable Rural District Councils to adopt this part of the Act, without first obtaining the leave of the County Council.

Under the Act of 1890, with the consent of the County Council, Rural District Councils are empowered to acquire land, by agreement or compulsorily, for the purpose of the erection of houses or cottages for working men.

From the statement made by the President of the Local Government Board when the Bill was introduced into the House of Commons, that, during the last 15

years, five Rural District Councils had availed themselves of the powers of the Act, with the result that only 44 houses had been erected, it is obvious that this portion of the Act has been practically a dead letter.

The substitution of Part I. of the Bill for Part III. of the Act of 1890 provides for a simpler method of purchase of land, being similar to that enjoyed by Parish Councils under the Local Government Act of 1894. In the same way a power of compulsory hiring of land is given.

The Land Clauses Act is incorporated, except the provisions of the Act with respect to the purchase and taking of land otherwise than by agreement. Any question of disputed compensation is to be dealt with in the manner provided by the Allotments Act of 1887, and, in determining the amount of such compensation, the arbitrator is not to make any additional allowance in respect of the purchase being compulsory.

At any inquiry or arbitration at which the disputed compensation is to be assessed, the arbitrator is to hear the parties interested, by themselves or their agents, and shall hear witnesses, but is to be precluded from hearing counsel or expert witnesses.

A District Council, on acquiring land, may themselves erect houses upon it or may lease it to some person for that purpose.

The period for repayment of loans is, in the case of a District Council, to be extended to 80 years. The Public Works Loan Commissioners, on the recommendation of the Local Government Board, are empowered to lend money at the rate of $2\frac{1}{2}$ per cent., or such other rate as the Treasury may consider necessary to enable the loan to be made without loss to the Exchequer. The Commissioners may also lend money to companies and

private individuals for the same purpose, for a period of 50 years.

The Bill provides for the neglect of a Rural District Council to carry out the provisions of the Act, by enacting that, in case of default, a Parish Council may complain to the Local Government Board, who, if they think fit, after due inquiry, may make an order limiting the time for performance of their duty, and, on the District Council being still in default, may enforce such order by writ of mandamus, or may make an order that the powers and duties be transferred to the County Council.

The Bill proposes that three acres of land may be put to each cottage, as against the half acre provided for in the Act of 1890.

The better provision of houses for the occupation of the working classes in rural districts resolves itself, in my opinion, almost entirely into a question of cost.

No doubt every Member of The Institution, and all others connected in any way with real estate, would welcome any change in the law which would enable workmen's houses to be erected at less cost. This, I think, can best be effected by the relaxation of existing by-laws, rather than by entrusting Rural District Councils with the power to erect houses on land acquired for that purpose.

I am strongly of opinion that local authorities should not be permitted to speculate with the rate-payers' money, in carrying out building schemes which will probably result in a loss and a consequent taxation of the ratepayers, some of whom may be erecting cottages to compete with them, while others have already made proper provision for the housing of labourers working upon their estates.

There is, no doubt, at the present time plenty of capital available for private individuals to erect all the houses that may be required, providing a reasonable return on the capital can be assured, but sound finance by local governing bodies is essential in order to inspire confidence in the investment of capital in real estate. The rates and taxes imposed upon real property are already very heavy and are continually increasing, so much so as to seriously retard the development of estates and the erection of workmen's cottages upon them, and the competition of District Councils in the erection of dwelling houses which would inevitably involve a further charge upon the rates should therefore, in my judgment, not be encouraged.

The Bill provides better facilities for the acquisition of land by District Councils for the erection of houses. I see no objection to land being acquired by them for the purpose, providing it is let out on building leases for the erection of houses, at such ground rents as will represent a reasonable return on the capital expended; but a District Council should not be permitted to enter into speculation of this sort, unless they are satisfied that it can be carried through without a charge ultimately falling upon the rates.

The Bill also provides that, on the complaint of four or more householders, or a Parish Council, the Rural District Council shall consider whether the by-laws can be amended, in order to facilitate the supply of workmen's houses, and the Local Government Board are directed, within six months of the passing of the Act, to draw up a model form of by-laws for rural districts.

Railway and tram companies are authorised to purchase or hire land for the purpose of erecting workmen's houses, and facilities are given to corporations, trustees,

and others to sell and lease land for the purpose for the best price that can reasonably be obtained, notwithstanding that a better price might be obtained if the land were to be used for another purpose.

I have dealt with the question of by-laws in my remarks on the subject in connection with Lord Hylton's Bill.

The proposed enabling of railway and tramway companies to hold land and build houses for the working classes who may not be in their employment might lead to the provision of more workmen's dwellings, but I am doubtful if these companies will embark in building schemes not connected with the housing of their own employees.

## Land Tenure Bill.

This Bill is to be construed with the Agricultural Holdings Acts of 1883 and 1900. It enables the tenant, on the determination of his tenancy, to claim compensation for his improvements, even although he continue in occupation.

The provisions of the Act of 1900, so far as relate to an arbitration before two arbitrators or an umpire, are repealed, and all arbitrations are to be before a single arbitrator.

The tenant is to be entitled to claim compensation for damage to his crops caused by game that he has not the lawful right to kill, and such claim can be made at any time during the tenancy.

The tenant can authorise any number of people to use firearms to kill hares and rabbits on his holding, and is also to have liberty, notwithstanding any contract to the contrary, to cultivate, crop, or dispose of the produce

on his holding as he may think fit, providing he makes adequate provision to protect the holding from injury or deterioration.

Unreasonable disturbance of a tenant in a holding by the landlord is to be made the subject of a claim by the tenant for compensation, and the landlord's right of distraint for rent is to be limited to a period of one year from the time of levying the distress.

The provisions of the Act of 1900 which require notice to the landlord of, or consent of the landlord to, the following improvements, are repealed, and the tenant is to be at liberty to carry out and to claim compensation at the termination of his tenancy in respect of them, viz. :—

(1) Laying down permanent pasture;

(2) Repairing buildings, roads, bridges, water-courses, ponds, wells, or reservoirs, or of works for the application of water power, or for supply of water for agricultural or domestic purposes;

(3) Planting of orchards, fruit bushes, or fruit trees;

(4) Planting of strawberry plants;

(5) Planting of asparagus, rhubarb, or other vegetable crops which continue productive for two or more years.

Every contract of tenancy entered into after the commencement of the Act is to contain a record of the condition of the buildings, fences, roads, drains, and cultivation of the holding, and at any time during a tenancy existing at the commencement of the Act the tenant may require a record to be made at the cost of the landlord.

The Council of The Institution have already drawn up, and laid before the President of the Board of Agriculture, a memorandum dealing with the provisions of the Bill. This points out that there has been no demand on the part of agriculturists for new legislation on the subject, and that it is generally recognised that the existing laws give ample compensation to the tenant farmer, while the fact that leases have been almost entirely superseded by yearly tenancies disposes of the suggestion that he is hampered by any feeling of insecurity. The Council also point out that the present Bill departs from the well-recognised policy of securing to the tenant full compensation for all improvements of a temporary character, the landlord being looked to for those of a permanent nature, and proposes to allow the tenant to experiment on permanent or capital improvements without the consent of the landlord, when the danger at once arises whether it may not prove the first step in the direction of that dual ownership which has proved so difficult to deal with in Ireland.

The Bill has been considerably amended in Committee, and it is now proposed that compensation can only be claimed by the tenant on quitting his holding, and Subsection 2 in Clause 1, which restricted the landlord's counter claim, is struck out.

Clause 2 has also been extended to provide that, where a tenant makes a claim for compensation for damage by game, such claim, in the case of damage to a growing crop, is to be made at least three weeks before the crop is reaped or grazed, and, in a case where the crop is already reaped or grazed, within one week before it is removed from the land. In cases where the right to kill game is vested in some person other than the landlord, the landlord is to be entitled to be indem-

nified by such other person against all claims under this head.

An addition has been made to Clause 4, which deals with the freedom of cropping and disposal of produce, to provide that, if the tenant exercises his rights in such a manner as to be likely to deteriorate the holding, the landlord shall be entitled to recover damages or, as the case may require, to obtain an injunction restraining the tenant's exercise of the rights. Further provision is also made that the section is not to apply in the case of the last year of the tenancy.

With regard to Clause 5, which provides for compensation for unreasonable disturbance, an addition has been made to the clause providing that, in the event of any difference arising as to the reasonableness of the cause of removal, or as to the amount of compensation, the difference, in default of agreement, is to be settled by arbitration.

Clause 6, which limits the time for distress, has been dropped.

Clause 7, which provides that the consent of the landlord need not necessarily be obtained to certain improvements, has been amended so as to include the improvements therein specified in Part 2 of the First Schedule of the Act of 1900. The effect of this is that the consent of the landlord is not required, but notice has to be given to him before the works are carried out, when the landlord has the option of himself carrying out the works and charging the tenant 5 per cent on the outlay.

The objections to the Bill have already been set out clearly and forcibly in the memorandum of the Council already referred to, and I am sure it will be the general feeling of the members of The Institution that there is no demand or necessity for it, and that it is a measure

which is likely to interfere with the pleasant relations which now exist, in the vast majority of cases, between landlord and tenant. I think it may be stated without fear of contradiction that all landlords are desirous of retaining a good tenant who farms well, that permission to sell off produce is always given to responsible tenants on their undertaking to bring back to the holding an equivalent in manure, and that so long as the land is farmed properly there is little or no restriction on the cropping; in fact, a tenant is practically given a free hand so long as he does not depreciate the holding.

The proposal to allow the tenant to authorise any number of persons to kill game on the holding is one which might be used so as almost to destroy the landlord's sporting rights, without any corresponding benefit to the tenant. I do not think this right would be largely exercised, but if exercised to any extent it might have the effect of lessening the personal interest which landowners now take in their properties, and might dispose them to look more upon their estates as a mere source of revenue, which would certainly not be to the interest of the tenant.

The Ground Game Act has, I think, worked well, and, under its provisions, a tenant has every reasonable facility for destroying ground game without seriously interfering with the landlord's sporting rights.

In connection with the compensation for disturbance, the Bill does not attempt to define what is meant by "unreasonably and without good and sufficient cause." Will this be considered to apply to a case in which a tenancy is determined because the holding is being neglected or is insufficiently stocked or cultivated?

The Council have recommended that all disputes under the Bill should be referred to an arbitrator appointed

by the Board of Agriculture on the request of either party, the costs in all cases to be at the discretion of the arbitrator.

In conclusion, I am of opinion that, in the interests of all parties in the state, legislation is to be deprecated which has no regard for existing contracts and creates a dual ownership in land.

It is to the joint interest of landlord and tenant to encourage and inspire confidence in investment in real estate. Special taxation will discourage investment of capital in the purchase or improvement of real property, and will divert it to investments abroad, and land-owners will certainly spend less on the improvement of their estates as their interest and enjoyment in them are diminished by legislation.

Mr. J. HENRY SABIN (Professional Associate of Council) said it gave him very great pleasure to propose that the best thanks of the Meeting be accorded to Mr. Willmot for his Paper. It said much for the wide range of the surveyor's profession that two Papers should have been read in succession, one on the raw material—the ground, the land from its earliest formation—and one on the use to which that land was put. The discussion must naturally be limited, but he would suggest that, in objecting to the taxation of land values as proposed by the Bill before Parliament, surveyors were not raising any carping criticism or any economic objection that could not be thoroughly upheld.

He believed that, as the whole corpus of a property was already taxed, it was a fallacy to suppose that a portion of it could be re-taxed without diminishing its value. It must follow that, if another rate or tax were put upon the property its value would be diminished,

and any attempt to prove that the value of a ground rent, which had no reversionary value, was not depreciated by the placing upon it of an additional tax, was fallacious from its inception.

The need of Corporations for more money was, without doubt, a growing one, and he agreed with the author of the Paper that, if an opportunity of obtaining more were given, that opportunity would certainly be seized Shakespeare said:

> "How oft the sight of means to do ill deeds
> "Makes ill deeds done,"

and one could hardly imagine a Corporation having an opportunity of placing a rate of 2*s.* in the £ on the freeholders of a city and not availing themselves of that opportunity to its fullest measure.

With regard to the other Land Bills referred to, he did not think there was any great objection to the main principles of the second and the third. But the principle underlying the fourth Bill was one to which he must take exception.

The Council of The Institution had done their best to make their objections felt, and although the published reports of the deputation which waited upon Earl Carrington did not seem to suggest that it had met with a great deal of success, he thought it would be found, by a perusal of the amended Bill, that their efforts had to a large extent been successful, and that there was a hope that when the Bill finally emerged from the House of Commons (if it survived the Session) such further amendments would be found in it as would considerably modify its more drastic provisions.

The most important alteration had been already passed, viz. that a tenant remaining in his holding

should not be able to claim compensation until he quitted. There were other considerable alterations to which Mr. Willmot had drawn attention.

With regard to Clause 5, dealing with compensation for disturbance, it had been asked what might be looked upon as a reasonable or a good and sufficient cause for disturbing a tenant. Would raising the rent of an obviously under-rented farm present an unreasonable or insufficient cause for disturbance? It seemed to him that, if in time to come the position of matters and an improvement of prices should have rendered a farm of higher rental value, it would not be unreasonable for the landlord to give the tenant notice to quit or to raise the question of the continuance of his tenancy.

There was a point with regard to one of the Bills to which he should like to refer. It was suggested that the occupier of a cottage should be put in possession of three acres of land, or that the area that might be allotted to a cottage should be increased to three acres. Three acres of land in three different parts of England might mean very different things. In a part of England from which he had just come, he learned that a family of ten children could be brought up on four acres of land, and that a very respectable income could be made out of it. He thought, however, all would agree that there were many parts of England where it would be very hard to bring up a very much smaller family on a very much larger area. The limit should, he thought, be fixed by the value of the land rather than by its area.

Mr. A. MICHELMORE (Fellow) said it gave him much pleasure to second the vote of thanks to Mr. Willmot for

his very able Paper, and as time was limited he proposed to devote the few remarks he wished to make principally to the Land Tenure Bill. Before passing to that, however, he would refer to the part of Mr. Willmot's Paper dealing with the new Public Health Bill. It occurred to him that the additional powers would in all probability have a salutary effect if limited to rural districts, but he thought it would be very mischievous that by-laws in urban districts should be easily and wantonly upset. Reference had been made to the question of the construction of roads in urban districts, and it seemed to him that a simple way out of the difficulty would be that roads constructed by the authorities should be, so to speak, graded; that is, where there was any possibility of a road becoming a main thoroughfare the greatest care should be taken in the laying out both with regard to construction and width.

All knew what an expensive proceeding it was to pull down one side of a street with a view to improving any particular locality, and he thought that in developing neighbourhoods great care should be taken that roads which might at any time become main thoroughfares should be constructed of sufficient width and durability.

With regard to the Land Tenure Bill, the Devon and Cornwall Provincial Committee had spent a considerable amount of time in an endeavour to thrash out its provisions with a view to suggesting amendments, and he might say that the greatest difficulty they experienced was to frame their recommendations in sufficiently moderate and temperate language. If they had given full expression to their feelings, it might have been thought that they were biassed, and the value of their recommendations would have been discounted.

Clause 2 of the Bill—compensation for damage by

game—would in his opinion open the door in many cases for fictitious claims, and would undoubtedly embitter the relations between landlord and tenant. There were at the present time cases within the knowledge and experience probably of every Member in that room where friction had been caused by the powers at present conferred by the Ground Game Act. If that Act were practically swept away, and replaced by the Bill now proposed, he feared that matters would become much worse.

Clause 3—as to the right of killing hares and rabbits—also bore on the Ground Game Act, and one could only hope that the relations between landlord and tenant might bear the strain, but he for one thought it very doubtful indeed. Perhaps it was expected that the landlord and the tenant would arrange shooting parties on the same day, one on one side of the hedge, possibly, and one on the other, and might agree to meet at lunch or something of that sort, and discuss their relative sport in a pleasant manner. But he feared that was more than one could hope for, and he looked with a certain amount of dread on the provision which was now proposed.

Freedom of cropping and disposal of produce appeared to him to absolutely destroy the leases and agreements at the present time in vogue, which, he believed had been compiled generally with the very greatest care, and which had worked with the best result.

Clause 5—compensation for unreasonable disturbance—opened a very wide door. As the reader of the Paper had asked, what was reasonable disturbance, and what would be unreasonable disturbance, and who would define it? It was fair to assume that the Board of Agriculture would appoint, as arbitrators to settle these

questions, gentlemen of undoubted repute and conscientious scruples; but, on the other hand, it was impossible to shut one's eyes to the fact that tenant right valuers were, as a rule, inclined to lean rather more on the side of the tenant than on that of the landlord.

He would put just one case. Imagine a man who owned a small estate of a few farms, and who had some sons. He wanted naturally to place those sons out on his estate. In order to do that he must get rid of one or more of his tenants. That probably would be construed as unreasonable disturbance, and the father, instead of being able to do what he liked with his own, would have to pay very dearly for the privilege of having his sons near him.

As to the record of the holding, that appeared to him to be most unjust. As it stood, an unreasonable tenant might require his landlord to take a record, say, once a year—as far as he could see there was nothing in the Bill to prevent his requiring it once a month—at the landlord's expense. The Devon and Cornwall Committee was of opinion that the expense should be borne by the party requiring it, and he thought that would be the most equitable arrangement.

He regarded this Land Tenure Bill, putting it in the most moderate language he could, as progressive legislation of the worst kind. It could not fail to breed discontent and mischief between landlord and tenant, and he contended that, as the custodians of real property, land agents should not leave a stone unturned to, ameliorate the provisions of the measure before it became law.

Lieut.-Col. W. R. Ludlow (Fellow) said that no words were too strong to condemn a good many of the

provisions contained in the Bills referred to in the Paper, which, he thought, Members of The Institution should, as the last speaker had said, endeavour to get modified before they became law. Already the prospect of this legislation was seriously interfering with property transactions, particularly in Birmingham, and, he believed, throughout the United Kingdom.

He would only give one instance of his own experience of the effect of the Land Values Taxation (Scotland) Bill. A Scotsman was in negotiation with him for a building estate, and they had very nearly come to terms —it was rather a large transaction—but when the New Scottish Bill was introduced the intending purchaser said, "Oh, no, that is the thin end of the wedge for a Land Taxation Bill for England," and declined to proceed. In a second case, of a large agricultural property, a prospective purchaser was frightened by the Land Tenure Bill, and in other cases negotiations had failed owing to the fear of impending legislation.

Reference has been made in the Paper to the great cost of the development of building estates, and he thought that the author had under-estimated the decrease which might be effected when he put it at 20 per cent. He thought it would be 30 or 40 per cent. if one could prevail upon the local authorities to be reasonable with regard to the construction of roads. It seemed ridiculous that the owners of land valued at £120 or £130 an acre, or 5*d.*, 6*d.*, or 7*d.* a yard, when they gave up land for the roads should have to pay £5 and £6 to make them, and stand out of their money for years. That, in his opinion, was doing a very great deal to discourage proper building for the population outside the towns.

It was most desirable to impress upon the authorities the necessity of checking the reckless extravagance in

municipal expenditure which was going on all over the country and was simply killing business. An owner of five houses had in many places to give the rent of three to pay the rates, which simply meant that there must be some check upon this prodigal expenditure. It was the last straw that broke the camel's back, and he was quite certain that, if surveyors did not do their utmost to stop legislation which threatened to impose still further burdens on the landed estate of this country, they would find their occupation almost gone.

Mr. W. FRASER (Fellow) said he thought the Paper well showed how lynx-eyed surveyors ought to be in regard to legislation affecting property. The profession owed a great debt of gratitude to Mr. Willmot for summing up the Bills in such a succinct and able manner, and giving such an excellent commentary upon their proposals. As a Glasgow surveyor he was most interested in the Land Values Taxation (Scotland) Bill, which really reflected the attitude of the Glasgow Corporation towards this question. In casting about for some new source of taxation the promoters had hit upon, as they thought, an untapped reservoir of wealth. They seemed to be, in common with other municipalities, in a state of chronic want, and the great beauty of the scheme, as it appeared to them, was that, while there would be no obvious increase of taxation upon the ratepayers who voted at the polls, yet the Corporation would be receiving a very large additional sum of money.

It seemed to him unfortunate, with regard to almost any legislation in this direction, that the promoters lost all sight of the old political canon that representation

and taxation ought to go together. There was no provision in the Bill for the property owners, who were going to contribute this large sum to the municipality, being represented or having any check on the way in which the money was to be expended.

A part of the Paper was devoted to dealing with the question of the taxation of existing ground rents and interference with existing contracts. Some of the Members present would remember that, in the debate on the second reading of this Bill in the House of Commons, the Lord Advocate, speaking on behalf of the Government, withdrew the suggestion *in toto*, and he had no doubt the last had been heard of it. At any rate one had to consider the proposals as they now stood.

The Bill had been referred to a Select Committee of the House of Commons to examine and take evidence and to report. The Committee was under the able chairmanship of the Solicitor-General for Scotland, from whom he was quite satisfied witnesses would have an impartial hearing. The Surveyors' Institution were tendering evidence by experts able to give most useful information.

A very large number of Members were returned to Parliament pledged to support the principle, but he was perfectly satisfied that they had no idea of the impracticability of carrying out the Bill as it now stood, and still less idea of the effect it would produce if passed. After hearing the evidence, he had little doubt they would be satisfied of its impracticability and its inequity, not only with regard to the landlords, but to all classes, and of its detrimental effect upon the housing question. They would also, he believed, have a very different view of the supposed profits made upon property transactions.

It would take too much time to touch upon all the details of the Bill, even in a cursory manner, but it seemed

to him that the great objection which might be urged before Parliament, and upon which an endeavour might be made to educate the people, was, in the first place, that the carrying out of the Bill would entail enormous expenditure on the ratepayers. All owners of property would have to make out a return, which would in itself involve a tremendous amount of expense and trouble.

A great deal of expense would then fall on the ratepayers generally, because most Scotch assessors were not equipped, either by experience or information, to judge of the returns sent in, and would require the assistance of a new and expert staff. Under the provisions of the Lands Valuation (Scotland) Act 1854, if the proprietor were dissatisfied with the assessor's opinion he had the right of appeal, in the first place, to a board composed of several magistrates, quite unqualified to pass judgment on a subject which involved a great deal of technical information. If still dissatisfied, the appellants had a right to appeal to the Court of Session, which was an extremely costly business.

What would probably most affect the public was that the rents, especially of working men's houses, would be raised very considerably by this kind of legislation. He did not refer to the workmen paying the additional tax. That would be a mere trifle, even if it were to happen; but the effect of the Bill would be, owing to the interference with builders and landowners, to increase the rents of the property. Further, by the everlasting tinkering by our municipalities with the subject of taxation, lenders and investors would be frightened away from dealing with property, and the natural result would be a scarcity of houses and consequent increase of rents. He could only hope that the supporters

of the Bill, after hearing the evidence, would be imbued with the idea that the proposals were unworkable and unjust.

Mr. HOWARD MARTIN (Vice-President) said he should like, in the short time available, to join in expressing the debt of gratitude due to Mr. Willmot for preparing and reading a clear and business-like statement as to the effects of proposed legislation on subjects which interested surveyors so much. It was not always easy to get a copy of parliamentary Bills, and, when one had got them, not always easy to understand them; it was therefore a great advantage to have a statement which enabled one to see what was proposed. Many must have feelings of thankfulness that, in the present state of business in Parliament, it could only pass a few Bills each session, and the possibility of harm being done was lessened. As to the Land Valuation Bill, the whole case was too complicated to be dealt with in a short time. The evidence taken by Parliamentary Committees and Commissions showed that all sites already covered with buildings did bear their burden of taxation; and any additional tax laid on the site itself was adding a special tax on to investments in real property, to the disadvantage of such investments as compared with others. If local authorities wanted more money they must obtain it justly. If they must tax investments they must tax them all, and not only the form of investment which it was most desirable people should be encouraged to possess.

With regard to the Public Health Amendment Act, he was not quite in accord as to the desirability of making by-laws uniform throughout the country. It

could not be denied that in closely populated districts certain restrictions were necessary which were not necessary in open rural districts. He thought the difference should be, not between urban and rural districts, but between houses within a certain distance of other buildings and outside, or between, districts with more or less than a certain number of houses to a given area.

The difference in the by-laws should be made in accordance with the merits of the case and not in accordance with the boundary line of two districts. It would, he believed, be a desirable thing in thoroughly rural districts that one should be allowed, under certain restrictions and rules, to provide cottages of wood. They would be suitable from every point of view, under proper conditions.

All would agree with Mr. Willmot as to the undesirability of the expensive requirements of local authorities in the construction of roads. He happened to be managing a large estate in an important watering place, and on the roads, along which nothing heavier than a dust-cart passed, metal had to be provided 15 inches thick after rolling with a heavy steam-roller.

With regard to the Housing of the Working Classes Act, the difficulty of housing the working classes was considerably increased by the unreasonable requirements of local bodies in the way of roads, and also by the danger of legislation such as that now under discussion. No landowners would lay out their land for the sake of creating ground rents until they knew what burdens they would have to bear, nor would builders take the risk of laying it out for that purpose. The Bill would be a hindrance to the cheap housing of the working classes.

He did not think there could be a better illustration of the immorality of the modern philanthropist than one of the clauses which provided that trustees might sell land for the housing of the working classes at less than its proper value, and thus take money out of the pockets of the helpless persons whose interests it was their duty to protect and transfer it to the working classes. He thought the modern philanthopist might be described as a person prepared to do any evil by legislative enactment if, what he considered a good end, might be served by it.

Mr. A. M. FOWLER (Fellow) said it was unfortunate that time did not permit the fuller discussion of this question. Most of the opinions expressed by previous speakers had been from the landowner's point of view, as might have been expected from a body of surveyors mostly representative of the landowners; but there was another side to these questions, and many arguments might be brought forward in favour of making property bear its legitimate share of the burdens of the community.

The vote of thanks having been put to the Meeting and carried unanimously, Mr. Willmot, in thanking the Members, signified his intention of replying to the discussion, if he were permitted to do so, in the next part of the *Professional Notes*.

The Meeting then adjourned.

## THE ANNUAL GENERAL MEETING

*Monday, May 28th*, 1906.

CHARLES BIDWELL (President) in the Chair.

The Report of the Scrutineers, appointed at the Ordinary General Meeting of Monday, May 14th, 1906, under the provisions of Article XLII. of the By-Laws, was read to the Meeting.

The Report declared that the following had been elected a

## COUNCIL FOR THE ENSUING YEAR.

*President.*

GEORGE LANGRIDGE.

*Vice-Presidents.*

THOS. TAYLOR WAINWRIGHT
JOHN WORNHAM PENFOLD
HOWARD MARTIN
ALEXANDER ROSE STENNING

*Members of Council.*

THE HON. EDWARD GERALD STRUTT
LESLIE ROBERT VIGERS
WILLIAM EDGAR HORNE
JOHN FARRER
WILLIAM EDWARD WOOLLEY
THOMAS BINNIE
HOWARD CHATFEILD CLARKE
EDWARD BLAKEWAY I'ANSON
JOHN GERMAN
GEORGE FRANCIS STEWART
FREDERICK GEORGE CHINNOCK
ROBERT NEVILLE HOLBECHE
HENRY W. D. THEOBALD
SAMUEL HOOD COWPER COLES
HENRY HERBERT SMITH
ARTHUR LYON RYDE

*Professional Associates of Council.*

JOSEPH HENRY SABIN
CHARLES PELL HALL

*Associates of Council.*

THE RIGHT HONOURABLE LORD ALVERSTONE, G.C.M.G.
(Lord Chief Justice of England).
SIR JOHN WOLFE BARRY, K.C.B.

The Report of the Council on the affairs of The Institution, and the Statement of Receipts and Expenditure for the year 1905 were read.

IT WAS RESOLVED—"That the Report of the Council and the Balance Sheet be received and approved, and be printed and circulated with the '*Transactions*.'"

IT WAS RESOLVED—"That the thanks of The Institution be given to Messrs. H. C. NEWMARCH and STANLEY HICKS for the efficient performance of their duties as Auditors, and that they be requested to continue their services for the ensuing year.

IT WAS RESOLVED—"That the thanks of The Institution are due and be given to the President, Vice-Presidents, and the other Members and Associates of the Council, for the able manner in which they have administered the affairs of The Institution."

IT WAS RESOLVED—"That the thanks of The Institution be given to Mr. PERCIVALL CURREY (the Honorary Secretary), to Mr. ALEXANDER GODDARD (the Secretary), and the other officers of The Institution, for the able manner in which they have executed their several duties."

THE PRESIDENT presented the following Prizes won by Candidates in the Professional and Preliminary Examinations, 1906:—

## THE PENFOLD SILVER MEDAL

for the highest percentage of marks (over 75% of the maximum) in the Students' and Non-Students' divisions of the Intermediate Examination 1905 to WILLIAM HENRY BAINES, who also won

## THE INSTITUTION PRIZE OF THE VALUE OF £15 15*s*.,

being placed first of the Student Candidates in the Intermediate Examination 1906.

## THE SPECIAL PRIZE," OF THE VALUE OF £10 10*s.*

to FREDERICK WILLIAM LORD, second in order of merit of the Student Candidates in the Intermediate Examination 1906.

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## THE PENFOLD GOLD MEDAL

to SIDNEY JAMES MURRELL for the highest marks (over 75 °/₀ of the maximum) in the Final Examination 1906.

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## THE DRIVER PRIZE OF THE VALUE OF £15

to HARRY JOHN VENNING for the highest marks gained by a Non-Student Candidate in the Intermediate Examination 1906.

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## THE "CRAWTER" PRIZE OF THE VALUE OF £10

to HENRY NORMAN SAVILL for the best work in the subject "Principles and Practice of Valuation" in the Final Examination 1906.

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## THE "BEADEL" PRIZE OF THE VALUE OF £5.

to GILBERT GEORGE SYMONS, for the best work in the subject "Agriculture" in the Intermediate Examination 1906.

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## THE "GALSWORTHY" PRIZE OF THE VALUE OF £15

awarded to the Candidate in the Final Examination, who having passed the previous Examination as a Student, is found to have obtained the highest aggregate of marks in the two Examinations combined, to HERBERT IVIE WYKES, the amount of the prize being devoted partly to the purchase of books and instruments and partly to the payment of the winner's annual and other subscriptions.

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## THE "SCOTTISH COMMITTEE" PRIZE OF THE VALUE OF £10 10*s.*

to WILLIAM ROSS YOUNG for the best work in the Intermediate Examination held in Glasgow 1906.

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## THE "PRELIMINARY PRIZE" OF THE VALUE OF £2 2*s.*

to JOHN BATSTONE, for the highest number of marks in the Preliminary Examination 1906.

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It was resolved—

"That the thanks of the Meeting be given to Messrs. J. H. MELLENFIELD, E. B. B. NEWTON, GRAHAM MOULD, and H. RIPPON for their services as scrutineers."

A vote of thanks to Mr. Bidwell for his conduct in the chair was carried unanimously, and the proceedings then terminated.

THE THIRTY-EIGHTH

# ANNUAL REPORT OF THE COUNCIL.

*Annual General Meeting, 28th May, 1906.*

In their Thirty-eighth Annual Report the Council have again the satisfaction of pointing to twelve months of such activity and growth as are indicative of the continued prosperity of The Institution. In so doing they wish to acknowledge cordially the support accorded to them by their fellow Members in their endeavour to direct the business of The Institution in the best interests of the profession, and in accordance with the original aims of its founders.

Comparative statistics in connection with the several classes of Members will be found in the following Table.

TABLE A.

| | Honorary Members. | Fellows. | Professional Associates. | Associates. | Students. | Colonial Fellows. | Total. |
|---|---|---|---|---|---|---|---|
| May 1904 | 18 | 1886 | 1140 | 80 | 409 | 27 | 3560 |
| May 1905 | 19 | 1893 | 1312 | 80 | 384 | 31 | 3719 |
| May 1906 | 25 | 1878 | 1502 | 74 | 361 | 36 | 3876 |
| | +6 | −15 | +190 | −6 | −23 | +5 | +157 |

The annual growth of the Membership of all classes is shown in the following table.

TABLE B.

| | Members (or "Fellows" after 1881). | Associates. | | Students | Total. |
|---|---|---|---|---|---|
| | | Professional. | Ordinary. | | |
| May 1869 ... | 162 | | 38 | 2 | 202 |
| „ 1870 ... | 180 | | 59 | 2 | 241 |
| „ 1871 ... | 190 | | 65 | 2 | 259 |
| „ 1872 ... | 205 | | 67 | 4 | 276 |
| „ 1873 ... | 225 | | 74 | 5 | 304 |
| „ 1874 ... | 247 | | 89 | 6 | 332 |
| „ 1875 ... | 275 | | 101 | 11 | 387 |
| „ 1876 ... | 300 | | 119 | 8 | 427 |
| „ 1877 ... | 310 | | 133 | 11 | 454 |
| „ 1878 ... | 312 | | 134 | 8 | 454 |
| „ 1879 ... | 330 | | 146 | 10 | 486 |
| „ 1880 ... | 342 | | 155 | 10 | 507 |
| „ *1881 ... | 357 | | 164 | 14 | 535 |
| „ 1882 ... | 480 | | 235 | 7 | 722 |
| „ 1883 ... | 557 | 218 | 74 | 38 | 887 |
| „ 1884 ... | 666 | 307 | 80 | 58 | 1121 |
| „ 1885 ... | 703 | 317 | 86 | 86 | 1192 |
| „ 1886 ... | 716 | 316 | 84 | 80 | 1196 |
| „ 1887 ... | 741 | 339 | 89 | 108 | 1277 |
| „ 1888 ... | 798 | 333 | 90 | 102 | 1323 |
| „ 1889 ... | 910 | 334 | 89 | 110 | 1443 |
| „ 1890 ... | 1095 | 310 | 89 | 123 | 1617 |
| „ 1891 ... | 1374 | 336 | 96 | 140 | 1946 |
| „ 1892 ... | 1646 | 342 | 97 | 172 | 2268 |
| „ 1893 ... | 1629 | 353 | 93 | 181 | 2269 |
| „ 1894 ... | 1626 | 381 | 84 | 204 | 2309 |
| „ 1895 ... | 1629 | 430 | 83 | 210 | 2352 |
| „ 1896 ... | 1802 | 465 | 86 | 220 | 2573 |
| „ 1897 ... | 1808 | 540 | 84 | 252 | 2684 |
| „ 1898 ... | 1835 | 615 | 85 | 272 | 2807 |
| „ 1899 ... | 1887 | 686 | 84 | 308 | 2965 |
| „ 1900 ... | 1883 | 757 | 88 | 336 | 3064 |
| „ 1901 ... | 1883 | 834 | 89 | 364 | 3170 |
| „ 1902 ... | 1891 | 906 | 86 | 392 | 3275 |
| „ 1903 ... | 1897 | 1025 | 86 | 396 | 3404 |
| „ 1904 ... | 1886 | 1140 | 80 | 409 | 3515 |
| „ 1905 ... | 1893 | 1312 | 80 | 384 | 3669 |
| „ 1906 ... | 1878 | 1502 | 74 | 361 | 3815 |
| | | | Honorary Members | | 25 |
| | | | Colonial Fellows | | 36 |
| | | | 1906 Grand Total | | 3876 |

* Since August, 1881, "Members" have been designated "Fellows" and, in 1883, "Associates" were divided into "Ordinary" and "Professional" Associates.

The Council have noticed with regret some falling off in the number of Students during the past two years. Having regard to the importance of young men, at the beginning of their business career, being imbued with that spirit which should arise from connection with an important professional body, they have made the following alterations in the regulations for students, in order that the advantages of enrolment in this class may be made more obvious.

1. Students to be allowed to make use of the Loan Library.

2. Students to be allowed to enter for the Preliminary Examination, provided that they have attained the age of 16 years and make a written statement that it is their intention to follow the profession of a Surveyor.

3. Students to be allowed to take the Intermediate Examination between the ages of 21 and 25 (subject to the disabilities mentioned in Rule 11 as to competing for Students' Prizes if over 21½ years old) retaining their advantages as to proportion of pass-marks and fees, but ceasing, in accordance with the by-laws, to be Students after the age of 21½ years.

4. In case of failure to pass the examination, Students' examination fees for subsequent entries, up to the age of 25 years, to be reduced from three to two guineas.

During the year the following additions have been made to our list of Honorary Members: The Right Honourable Sir John Fletcher Moulton, Lord Justice of Appeal, The Honourable Mr. Justice Henry Sutton, and their Honours Judge Henry Hans Hamilton and Judge Wheeler, K.C., on elevation to the Bench; also Mr. Henry Trethewy, a very old Member of the Institution,

and Mr. Julian C. Rogers, as a recognition of his thirty-six years' valuable services to The Institution.

The Council have to record with sincere regret the loss by death of a number of valued Members during the past year. Mr. John Shaw, who occupied the Presidential Chair in 1900, will be specially missed by his colleagues on the Council, although failing health had made it impossible of late years for him to attend their deliberations so regularly as in former years. In him, and in Sir Jacob Wilson, K.C.V.O., The Institution has lost two of its oldest Members, each of whom had taken a foremost part for many years in all matters connected with agricultural and rural interests in Great Britain.

Among others whom death has removed during the year may be mentioned, with sincere regret, Mr. R. A. Bryden, Mr. T. H. Burd, Mr. J. Crawter, Mr. H. H. Collins, Mr. J. Dansken, Mr. A. Finn, Mr. H. Furber, Mr. J. Green, Mr. M. Nockolds, Mr. J. Price, Mr. F. J. Turner, Mr. C. A. White, and Mr. O. F. Stenning.

## Finance.

The Receipts continue to show an increase commensurate with the growth of The Institution. The ordinary expenditure does not present any particular feature, with the exception of a somewhat heavy increase in the cost of Publications. In the case of *Transations* the amount of matter published has been considerably larger, and the cost of the *Professional Notes* has exceeded that of last year by £150, owing to three parts having been included as against two in last year's account.

An opportunity having occurred of acquiring the

head lease of No. 11, Great George Street it was thought advisable to take advantage of it, in view of the possibility of the building being needed at some future date for the extension of The Institution premises. The necessary funds for the purchase were provided from the Accumulated Account, and the transaction was thus arranged without loss of income.

## Table C.

| Receipts. | £ | s. | d. | Payments. | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Revenue Balance in hand, 1st, January 1905 | 868 | 2 | 3 | Total Payments out of Revenue (Current Expenses) | 10,131 | 12 | 5 |
| Total Receipts on Revenue | 10,247 | 6 | 11 | Balance paid out of Examinations Suspense Account | 3 | 3 | 0 |
| Examinations Account | 582 | 16 | 11 | Purchase of £2,298 15*s.* 6*d.* Consols 2½ per cent. | 2,100 | 11 | 2 |
| Loan Account | 600 | 0 | 0 | Purchase of No. 11, Great George Street, Westminster | 20,230 | 19 | 8 |
| Receipts on Capital Account | 927 | 3 | 0 | Purchase of Furniture | 217 | 14 | 6 |
| Sale of Investments | 20,105 | 14 | 4 | Balance in hand, December 31st, 1905 | 684 | 7 | 1 |
| Reserve Fund | 37 | 4 | 5 | | | | |
| | £33,368 | 7 | 10 | | £33,368 | 7 | 10 |

## The Examinations, 1906.

The subjoined Table D shows the number of Candidates who have presented themselves for the Preliminary and Professional Examinations from year to year, with the number of successes and the percentage of passes to total entries.

## TABLE D.

| Years. | Preliminary Examinations. | | | Professional Examinations. | | |
|---|---|---|---|---|---|---|
| | Candidates. | Passed. | Percentage. | Candidates. | Passed | Percentage. |
| 1881 | 13 | 6 | 46·15 | | 1 | 50·00 |
| 1882 | 30 | 17 | 56·66 | — | — | — |
| 1883 | 44 | 22 | 50·00 | 25 | 22 | 88·00 |
| 1884 | 51 | 30 | 58·82 | 36 | 23 | 63 89 |
| 1885 | 46 | 37 | 80·43 | 43 | 31 | 72·09 |
| 1886 | 46 | 34 | 78·26 | 56 | 38 | 67·85 |
| 1887 | 53 | 39 | 73·58 | 58 | 45 | 77·59 |
| 1888 | 48 | 39 | 81·25 | 73 | 52 | 71·23 |
| 1889 | 51 | 41 | 80·39 | 71 | 51 | 71·83 |
| 1890 | 53 | 44 | 83·01 | 96 | 70 | 72·91 |
| 1891 | 76 | 60 | 78·94 | 92 | 68 | 73·91 |
| 1892 | 83 | 64 | 77·10 | 125 | 93 | 74·40 |
| 1893 | 77 | 57 | 74·00 | 149 | 100 | 67·11 |
| 1894 | 97 | 66 | 68·00 | 182 | 129 | 70·87 |
| 1895 | 121 | 80 | 66·11 | 196 | 141 | 71·93 |
| 1896 | 117 | 78 | 68·37 | 212 | 143 | 67·45 |
| 1897 | 133 | 91 | 68·42 | 236 | 151 | 63·97 |
| 1898 | 127 | 95 | 74·80 | 265 | 169 | 63·77 |
| 1899 | 145 | 112 | 77·25 | 290 | 184 | 63·44 |
| 1900 | 131 | 102 | 77·86 | 325 | 193 | 59·38 |
| 1901 | 142 | 111 | 78·45 | 362 | 246 | 67·95 |
| 1902 | 165 | 133 | 80·06 | 369 | 241 | 65 30 |
| 1903 | 151 | 108 | 71·52 | 424 | 294 | 69·34 |
| 1904 | 152 | 108 | 71·05 | 480 | 370 | 77·08 |
| 1905 | 132 | 88 | 66·66 | 505 | 399 | 79·00 |
| 1906 | 190 | 106 | 55·78 | 535 | 349 | 65.23 |
| TOTALS | 2,474 | 1,768 | 71·45 | 5,207 | 3,603 | 69·19 |

Included among the 535 Candidates who sat for the Professional Examinations are 38 who were re-examined in their respective typical subjects. Of these, 6 were "Land Agency" Candidates, who were all successful; 22 "Valuation" Candidates, of whom 15 were successful; and 10 "Building and Quantity Surveyor" Candidates, of whom 5 passed.

Of the 497 new Candidates, 323 were successful, while 24 "Valuation" and 29 "Building and Quantity"

Candidates failed only in their respective typical subjects, and were referred back for re-examination in those subjects on a future occasion.

Included among the 497 new Candidates were 7 Scottish Candidates, examined in Glasgow, of whom 6 passed, and 4 Irish Candidates, examined in Dublin, all of whom satisfied the Examiners.

Table E gives the number of Candidates and marks obtained in each Division and Sub-division, with the number and percentage of passes, the number "referred "back" in their typical subjects, the marks obtainable and obtained, the percentage of possible marks, and the percentage of succesful Candidates to entries.

The Scottish and Irish Candidates, being examined on a different basis, are excluded from this table, and this will account for the difference between the percentages of passes shown in Table D and Table E.

The Table does not show the number of Candidates who, having previously failed to pass in their typical subjects, came up in 1906 to complete their examinations.

## TABLE E.

| | Sub-Division I. Land Agency. | | | Sub-Division II. Valuation. | | | Sub-Division III. Building and Quantities. | | | Total Maximum Marks. | Marks obtained. | Percentage of Marks obtained. | Percentage of Candidates who Passed. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Examined. | Passed. | Referred Back. | Examined. | Passed. | Referred Back. | Examined. | Passed. | Referred Back. | | | | |
| Intermediate Examination. Students | 20 | 16 | | 45 | 29 | 7 | 23 | 18 | 4 | 88,000 | 51,651 | 58·69 | 71·59 |
| Intermediate Examination, Non-Students | 59 | 34 | | 91 | 49 | 10 | 86 | 57 | 13 | 236,000 | 137,103 | 58·09 | 50·92 |
| Final Examination | 28 | 18 | | 74 | 56 | 6 | 50 | 31 | 11 | 152,000 | 94,029 | 61·86 | 68·81 |
| Direct Fellowship Examination | 2 | 1 | | 3 | 2 | 1 | 6 | 2 | 1 | 16,500 | 10,547 | 63·92 | 45·45 |
| Totals ... | 109 | 69 | | 213 | 136 | 24 | 165 | 108 | 29 | 492,500 | 293,330 | 58·56 | 64·27 |

From the statistics given above, it will be noticed that, in both the Preliminary and Professional Examinations, while the number of entries exceeded any previous record, the number of Candidates who satisfied the examiners was proportionately much below the average of recent years.

### THE PRIZES.

The Prizes in connection with the Examinations of 1906 were awarded as follows:—

The "Institution" Prize, value 15 guineas, to William Henry Baines, a Student Candidate in the "Building" sub-division, who passed at the head of the list with 797 marks, and who also gained

The "Penfold Silver Medal," awarded annually for the best marks in the two sections (Student and Non-Student) of the Intermediate Examination, calculated on the basis of their respective pass marks.

The "Special" Prize, value 10 guineas, to Frederick William Lord, the Student Candidate next on the list, who obtained 763 marks in the "Valuation" sub-division of the Intermediate Examination.

The "Penfold Gold Medal," to Sidney James Murrell, for the highest total of marks in the Final Examination. This Candidate, in the "Valuation" sub-division, gained 820 marks out of a possible 1,000.

The "Driver" Prize, value £15, to Harry John Venning, who passed at the head of the list of Non-Student Candidates with 808 marks out of 1,000 in the "Building" sub-division of the Intermediate Examination.

The "Beadel" Prize, to Gilbert George Symons, a non-Student Candidate, for the best work (77% of the maximum marks) in the subject "Agriculture" in the Intermediate Examination.

The "Crawter" Prize, to Henry Norman Savill, for the highest marks (86% of maximum) in the subject "Principles and Practice of Valuation" in connection with the Final Examination.

The "Galsworthy" Prize, to Herbert Ivie Wykes, a "Valuation" Candidate in the Final Examination. This Prize is given annually to the Candidate whose marks in

the Final Examination, and those gained in the Intermediate Examination for which he entered as a Student Candidate, combine to form the highest total. The prize winner's marks were 784 in the Final and 783 in the previous Intermediate Examination, a total of 1,567 out of a possible 2,000, or 78 per cent.

The "Scottish Committee" Prize of 10 guineas to William Ross Young for the best work in connection with Professional Examinations in Scotland (76% of full marks).

The "Preliminary" Prize, to John Batstone, who passed this year at the head of the list of Candidates in the Preliminary Examination.

## The Examiners.

The Council desire again to record their sense of deep obligation to those gentlemen who have undertaken the arduous task of setting the work and awarding the marks in the various subjects in connection with the Examinations of 1906. They would specially mention the work done, in a purely honorary capacity, by Mr. J. W. Willis Bund, Mr. E. J. Castle, K.C., Mr. R. F. Colam, Mr. J. E. Drower, Mr. H. A. Rigg, and His Honour Judge F. A. Philbrick, K.C., in setting the legal papers, and by Mr. W. Eve, Mr. E. J. Harper, Mr. F. Lee, Mr. F. J. C. May, Mr. C. John Mann, Mr. J. Douglass Mathews, Mr. J. H. Oakley, Mr. J. W. Tyler, and Mr. J. D. Wallis, in the more essentially professional subjects.

Among the Members of the Council, the following again acted as Honorary Examiners: Mr. Daniel Watney, Mr. T. M. Rickman, Mr. A. Vernon, and

Mr. H. T. STEWARD, Past Presidents; Mr. G. LANGRIDGE and Mr. J. W. PENFOLD, Vice-Presidents; and Mr. H. CHATFEILD CLARKE, Mr. E. B. I'ANSON, Mr. H. W. D. THEOBALD, and Mr. J. HENRY SABIN.

Mr. PERCIVALL CURREY again undertook an important professional subject.

The cordial thanks of the Council are also due for the valuable co-operation of those Provincial Members who have rendered such efficient services as Examiners and Moderators in connection with the Branch Preliminary and Professional Examinations in Glasgow, Dublin, and Manchester.

## THE INSTITUTION SCHOLARSHIPS.

The Council would remind Members that the first examinations in connection with the Institution Scholarships, tenable at the Universities of Cambridge, and North Wales, Bangor, and at the Armstrong College, Newcastle-on-Tyne, will be held about July next at those centres.

Arrangements are now under consideration, and particulars will shortly be obtainable either from the Universities or from the Secretary of The Institution.

That this new departure may have the full beneficial effect which is to be anticipated, it is necessary that it should be made as widely known as possible, and the Council feel that they may rely upon Members to do all in their power to second their efforts in this direction.

## THE SESSIONAL PAPERS.

A number of valuable Papers, giving rise to instructive discussions, have been added to the *Transactions*, and

the Council feel that they are only expressing the wish of every Member of The Institution in recording their thanks to the writers for the thought and labour given to their compilation.

In acknowledging their indebtedness to the authors of Papers, the Council desire to express regret that greater advantage has not been taken by country Members of the two afternoon meetings, specially arranged in order to enable them to be present.

The Gold Medal for the best Paper read during the Session 1904-5 was awarded to Mr. E. Morten, Barrister-at-Law, for his able and useful address on "Surveyors' "Reports and Certificates."

The winner of the medal the previous year was Mr. J. Smith Hill, Associate, who read a most interesting Paper on "Agriculture in Cumberland, 1850-1900" at the Country Meeting held at Newcastle-on-Tyne.

## The Library.

The Library has been enriched by the addition of a number of useful works, and an attempt has been made to bring the editions of the many works of reference which it contains up to date.

The advantages of the Loan Library are being more fully recognised by Country Members, and the Council are pleased to be able to report that the number of books in circulation shows a progressive increase from year to year.

They would here wish to refer to the obligation imposed upon Members by By-law 32 to make some contribution to the Library within a short time of their

election to the Membership. They would remind those who have not fulfilled this obligation that, on election, they signed a declaration pledging themselves to comply with the by-laws and specifically promising to make some contribution or donation to the Library.

## Provincial Committees.

The Provincial Committees have again proved their value to The Institution in advising as to the eligibility of Candidates for examination and transfer, and the Council would lay special stress upon the importance of their assistance in this respect. It is obvious that in many cases the eligibility of a Candidate can best be judged by Members on the spot, who have the means of investigating his professional antecedents and ascertaining his qualifications. It being of the greatest importance to The Institution that only qualified men should be admitted, the Council wish to impress upon all concerned the necessity for special care being taken in examining these applications, to insure that no Candidate shall be accepted who does not come fairly within the definition of Surveyors laid down in Section 1 of the By-laws.

It is now 18 years since the Provincial Committees were first organised, and their existence has been abundantly justified, not only by the assistance they have so willingly rendered in the direction above indicated, but by the opportunity they have afforded of bringing Country Members and country opinions into closer touch with the central body. A good example of this has been afforded during the past year in the valuable inform-

ation obtained through the Provincial Committees on the pressing questions of Small Holdings and the Land Tenure Bill.

As a further means of enabling the Council to come into more direct relations with Country Members, who, owing to distance from Town or other causes, may be unable to attend the meetings or take a direct part in the business of The Institution, they have nominated the Provincial Chairmen to act with them on one or other of the Standing Committees.

Another considerable change has been made. Up to the present, Professional Associates have had no *locus standi* on the Provincial Committees. With the object, however, of interesting them in the business of their local branches, and thus indirectly in that of The Institution itself, and helping them to realise the responsibilities as well as the advantages of membership, they have been made Members of the Provincial Committees, with full rights of attending Meetings and taking part in the discussions. It is hoped that this new departure may have the double effect of increasing the interest in the discussions and business of the Committees, and in making The Institution a more intimate factor in the professional life of the younger Members.

From geographical causes the Members of the North Wales Committee, comprising the counties of Anglesey, Carnarvon, Denbigh, Flint, Merioneth, Montgomery, and Radnor, found it impracticable to hold meetings, and the Committee was unfortunately lapsing into inactivity. A re-arrangement has therefore been carried out, Montgomeryshire and Radnorshire being added to the Salop and Hereford Committee under the title of the Salop, Hereford, and Mid-Wales Committee, and the five remaining counties, which possess a better railway

connection, becoming the newly constituted district of the North Wales Committee.

The present Provincial Committees, with the names of the Chairmen for the year, and the number of Members forming the Committees, will be found in the subjoined table.

TABLE F. PROVINCIAL COMMITTEES.

| Committee | Chairman. | Number of Members. |
|---|---|---|
| Northumberland and Durham ... | C. E. Carr ... | 48 |
| Cumberland and Westmoreland ... | J. Banks ... ... | 35 |
| Lancashire and Cheshire ... ... | T. Silk Wilson | 161 |
| Yorkshire ... ... ... ... | R. Armistead ... | 133 |
| Salop and Hereford and Mid-Wales... | H. J. Wyley ... | 49 |
| Derby and Stafford ... ... ... | W. W. Jeudwine | 58 |
| Nottingham and Lincoln ... ... | C. W. Tindall | 60 |
| Monmouth and South Wales... ... | R. Forrest ... | 61 |
| Warwick and Worcester ... ... | W. D. G. Brown | 84 |
| Leicester, Northampton, and Rutland | W.G.S.Rolleston | 63 |
| Cambridge, Huntingdon, Norfolk, and Suffolk ... ... ... ... | J. Looker ... | 91 |
| Berks, Bucks, and Oxon ... ... | W. A. Simmons | 88 |
| Beds, Essex, Herts, and Middlesex ... | J. Weall ... ... | 150 |
| Devon and Cornwall ... ... ... | E. C. Rundle ... | 80 |
| Somerset, Glo'ster, and North Wilts | P. Addie ... | 81 |
| Hants, Dorset, and South Wilts ... | C.F.S.Sanctuary | 142 |
| Kent ... ... ... ... ... | H. M. Cobb ... | 145 |
| Sussex ... ... ... ... ... | W. F. Ingram | 85 |
| North Wales ... ... ... ... | W. A. Dew ... | 27 |
| Irish Committee .. ... ... | R. M. D. Sanders | 209 |
| Scottish Committee ... ... ... | T. Binnie ... | 85 |

LECTURES TO PROVINCIAL COMMITTEES.

The Council's scheme of providing, at the expense of The Institution, lecturers of established repute to open dis-

cussions at Meetings of Provincial Committees, on subjects of professional interest, has now been in operation for upwards of twelve months, and has been taken advantage of with satisfactory results on four occasions. From communications on the subject, which have been received from Provincial Chairmen, it is evident that a more general response to the Council's offer would have resulted had it not been for the introduction of the Land Tenure Bill in the House of Commons, which has provided an ample topic for discussion at the local meetings held during the present year.

The four lectures which have been given have been valuable in themselves, and have had the effect of stimulating both attendance and discussion at the Meetings. The experiment has, during the comparatively short period it has been under trial, proved sufficiently successful to justify its continuance, and the Council will be glad to consider further applications for lecturers on special subjects.

## Council Attendances.

The following table gives the attendances of Members of the Council at Council, Committee, and General Meetings from April 12th, 1905, to April 2nd, 1906 (both inclusive).

| NAMES. | Council Attendances. | Attendances at Ordinary General Meetings. | Committee Attendances. | Total Attendances. |
|---|---|---|---|---|
| MEMBERS. | | | | |
| Bidwell, C. ... ... (*President*) | 12 | 5 | 12 | 29 |
| †Binnie, T. ... ... | | | | |
| Buck, A. ... ... | 4 | 3 | 1 | 8 |
| Chinnock, F. G. ... | 9 | 3 | 6 | 18 |
| Clarke, H. C. ... ... | 12 | 7 | 30 | 49 |
| Cowper-Coles, S. H.... | 4 | 5 | 3 | 12 |
| Drew, J. G. ... ... | 1 | | | 1 |
| Farrer, J. ... ... | 3 | | 3 | 6 |
| German, J. ... ... | 5 | 3 | | 8 |
| Holbeche, R. N. ... | 6 | | 3 | 9 |
| Horne, W. E.... ... | 8 | 2 | 2 | 12 |
| I'Anson, E. B. ... | 9 | 4 | 15 | 28 |
| Langridge, G. ... | 13 | 10 | 21 | 44 |
| Martin, Howard ... | 12 | 8 | 21 | 41 |
| Penfold, J. W. .. | 13 | 10 | 9 | 32 |
| Rickman, T. M. ... | 8 | 2 | 18 | 28 |
| Rolleston, Sir J. F. L. | 2 | | 11 | 13 |
| *Shaw, J. ... ... | | | | |
| Squarey, E. P. ... | | | 1 | 1 |
| Stenning, A. R. ... | 12 | 1 | 21 | 34 |
| Steward, H. T. ... | 10 | 2 | 15 | 27 |
| §Stewart, G. F. ... | 1 | | | 1 |
| Strutt, Hon. E. G. ... | 11 | 3 | 9 | 23 |
| Theobald, H. W. D.... | 13 | 2 | 18 | 33 |
| Vernon, A. ... ... | 6 | 3 | 2 | 11 |
| Vigers, L. R.... ... | 12 | 4 | 14 | 30 |
| Vigers, R ... ... | 3 | 1 | 16 | 20 |
| Wainwright, T. T. ... | 2 | 1 | 1 | 4 |
| Watney, Daniel ... | 11 | 4 | 10 | 25 |
| Woolley, W. Edward | 8 | 3 | 4 | 15 |
| PROFESSIONAL ASSOCIATES. | | | | |
| Hall, C. P. ... ... | 7 | 2 | 5 | 14 |
| Sabin, J. H. ... ... | 12 | 7 | 28 | 47 |

* Deceased.
† Representing the Scottish Committee.
§ Representing the Irish Committee.

Distance from London has prevented the representatives of the Scottish and Irish Committees from attending meetings, but the Council cordially acknowledge the value of the assistance, which their intimate acquaintance with the circumstances affecting real estate in their respective countries, has enabled them to place at the disposal of The Institution.

## The London Building Acts.

As mentioned in the last Annual Report, the London Building Act (Amendment) Bill of 1905, as introduced, aroused such opposition that its promoters decided to abandon all but the clauses dealing with the prevention of fire. The provisions contained in this portion of the Bill were very carefully considered by the Council, and, with a view to putting the experience of practical surveyors at the disposal of the Legislature, a number of amendments were drawn up, and The Institution was represented by counsel and witnesses before Committee in both Houses of Parliament. The result of this action was that, when the measure received the Royal Assent, it had lost many of the more objectionable provisions which it at first contained, and may, in its present form, be reasonably expected to fulfil the purpose for which it was passed.

The opposition which led to the abandonment of the remainder of the Bill caused its promoters to recognise that, if further amendment of the London Building Acts were to be attempted, it would be necessary to give the matter fresh consideration. To assist them in deciding how practical improvement might best be effected, the Building Committee of the London County Council requested The Surveyors' Institution and kindred professional bodies to give them the advantage of their

experience. A special Committee was accordingly appointed by the Council which gave a considerable amount of time and labour to the subject, with the result that a memorandum, pointing out not only the reason for objection to the various proposals in the 1905 Bill, but the manner in which the existing Acts might with advantage be amended, was drawn up and submitted to the County Council.

## The Land Tenure Bill.

Although a Private Member's Bill, the fortune of the ballot enabled this measure to come up for second reading early in the Session, when it was passed by a large majority and, receiving the approval of the Government, was referred to the Grand Committee on Trade.

Its provisions are well known to Members, and need not therefore be detailed here. The Council recognised at once that their adoption would mean a long step in the direction of dual ownership, with its attendant dangers to the agricultural interest, and immediate action was therefore decided upon.

The Provincial Committees were asked to discuss the measure, and to place their views before the Council, while a Committee of the Council was set up to consider the Bill clause by clause, and to determine how best it could be amended. A comprehensive memorandum was draw up by this Committee, and the dangers to be anticipated from the measure, together with a number of suggested amendments, were laid before the President of the Board of Agriculture and Fisheries by a strong deputation. Steps were also taken to make Members of Parliament for agricultural constituencies

conversant with the opinions held by Members of The Institution on the subject.

The Bill has recently been considered by the Grand Committee, and has now been reported to the House, with amendments, for Third Reading. The Council are pleased to note that many of the objectionable proposals, which at first characterised the Bill, have been eliminated, and in its present form it embodies, with one important exception, the suggestions for improvement which were submitted to the Government in the memorandum drawn up by the Council. The exception referred to is the compensation for disturbance allowed under Clause 5, which it is still hoped may be modified before the Bill becomes law.

A new clause, intended to make Section 4 of the Market Gardeners' Compensation Act, 1895, retrospective, has been added, but it seems doubtful whether in its present form it would override the decision in the Scottish case of *Callander* v. *Smith*.

### The Land Values Taxation (Scotland) Bill, &c.

Another measure which, although confined to Scotland, embraces a principle which, if adopted, would inevitably be extended to the rest of Great Britain, is the Land Values Taxation (Scotland) Bill. After being read a second time in the House of Commons, it has been referred to a Select Committee, and steps are being taken to insure that The Institution shall be represented among the witnesses called to give evidence before the Committee. The subject is one of interest to every Member of the profession, and the Council feel that the Majority Report of the Royal Commission on Local Taxation, adverse to the proposals for the separate rating

of land values, should not be lightly set aside without the Legislature being made thoroughly conversant with the views of those who would, to a great extent, be responsible for carrying out such proposals in practice.

The services of The Institution have also been called upon in connection with the Royal Commission on Motor Cars, and the Departmental Committee on Small Holdings.

In the case of the former, two Members were nominated to give evidence before the Commission. In the latter, the President of The Institution was chosen by the late Minister for Agriculture to form one of the Committee, while other Members have given evidence before it. Valuable information was also provided through the Provincial Committees, replies to a number of questions relative to Small Holdings being thus obtained from Members having experience on this subject.

## The Rogers Portrait.

In response to the appeal for subscriptions towards the presentation of his portrait to Mr. Julian C. Rogers, as some acknowledgment of his many years of arduous work for The Institution as Secretary, the sum of £317 was contributed.

Mr. Stanhope A. Forbes, A.R.A., was commissioned to carry out the work, and the portrait, at present on exhibition at the Royal Academy, will be presented to Mr. Rogers at the opening meeting of next Session.

## The Employment Register.

The Council are glad to be able to report that the value of the Employment Register, as a means of

securing qualified assistants, has been more fully recognised by Senior Members during the past year.

At the same time they feel that full advantage is not yet taken of the facilities offered under this head, and they would strongly urge all Members who have vacancies for assistants or improvers to apply, in the first place, to the secretary for particulars of any suitable men whose names appear in the register, and thus to lend a helping hand to fellow Members at the outset of their career.

It will be seen from this Report how varied are the subjects with which the Council is called upon to deal.

The time entailed in conducting the business of a large Institution is necessarily considerable, but the Members of the Council appreciate the honour which has been accorded to them in their election, and will continue to use their best endeavours to justify the confidence which has been reposed in them.

## ADDENDUM.

The Country Meeting, which has now become a recognised part of the Annual Programme of The Institution, was held in Birmingham, by invitation of the Warwickshire and Worcestershire Provincial Committee, on the 24th and 25th May.

A large number of the Members attending assembled in Birmingham on the evening of the 23rd, and the proceedings were opened the following morning by the Lord Mayor. In cordially welcoming the visiting Members on the occasion of their first official meeting in the capital of the Midlands, he referred to the good work which had been done by The Institution in raising the standard of professional education by its examinations and by the scholarships which it had established at the Universities.

By kind permission of the Lord Mayor, the opening ceremony and subsequent conference were held in the Council Chamber, a courtesy to which the President, Mr. Charles Bidwell, alluded in warm terms of appreciation in thanking the Lord Mayor for the honour he had conferred in receiving them, and for the sympathetic manner in which he had referred to the aims and work of The Institution.

The initial proceedings having been completed, the Chair was taken by the President, who read a letter from Sir Oliver Lodge, F.R.S., expressing regret that an attack of influenza confined him to his room and prevented him from giving the Address which was included in the programme under his name.

The following Papers were then read and discussed:

1. "The History of Birmingham," by Mr. H. A. Pritchard, Deputy Town Clerk.
2. "The Economic Geology of the Birmingham District," by Professor Lapworth, F.R.S., Birmingham University.
3. "Proposed Legislation affecting Real Estate," by Mr. John Willmot (Fellow).

The last Paper, being of great and immediate professional interest, gave rise to an animated discussion,

which might very usefully have been prolonged had time permitted. The arrangements for the afternoon programme, however, made this impossible, and hearty votes of thanks having been unanimously passed to the readers of the Papers, the morning conference was brought to a close.

An adjournment was then made to the Grand Hotel, where upwards of 150 visiting members and guests, among whom was the Lord Mayor, were entertained at luncheon by the Provincial Committee, under the Chairmanship of Mr. W. D. Gilpin-Brown. The afternoon was taken up with visits to different places of interest in the neighbourhood of Birmingham, arrangements having been made for members of the local committee to conduct parties to the Birmingham Sewage Farm, to Messrs. Cadbury's Model Village at Bournville, the Wolseley Tool and Motor Car Company's Works, Saltley, Messrs. Elkington's Electro-Plate Works, Messrs. Osler's Glassworks, the Generating Station of the City Electric Supply, and the New University Buildings. In connection with these visits the thanks of The Institution are due not only to the Members who made the arrangements for, and personally conducted, the excursions, but also to the gentlemen who so kindly gave facilities for the inspection of their works.

In the evening a well-attended dinner took place, the President of The Institution being in the Chair and a number of guests, representative of the City of Birmingham, its trade and its professional societies, being present

The second day was, as usual, given up to excursions to places of historical or professional interest within the district. Fortunately, the weather proved all that could be desired, and this, combined with excellent arrange-

ments on the part of the local committee, enabled a most enjoyable day to be spent.

The first party took an early train to Leamington, and drove thence to Kenilworth, where, thanks to the kind thought of Mr. Hurst Flint, representing the Earl of Clarendon, special facilities were given for viewing the castle. The drive was then continued past Guy's Cliff to Warwick, where luncheon was served prior to a visit to the famous castle. Here Mr. H. Godfrey Paton, the agent to the Earl of Warwick, had been good enough to obtain special permission for Members to see parts of the castle which are not usually shown to the public, and warm thanks are due to him and to his Lordship for the arrangements which contributed so materially to the success of the excursion.

A second party travelled to Stratford-on-Avon, where they had an opportunity of seeing Shakespeare's birth-place, the Gild Chapel, the beautiful Church of Holy Trinity, the Memorial Theatre and Museum and other buildings of interest to the antiquary or to lovers of the national poet. After luncheon, carriages were taken to Warwick, passing on the way one of the finest examples of Elizabethan domestic architecture in the country, Charlcote Hall, the residence of Sir Henry Ramsay-Fairfax-Lucy, whose ancestor, Sir Thomas Lucy, was satirised by Shakespeare in the character of Justice Shallow.

On arrival at Warwick, Members taking part in this excursion had a good opportunity of visiting Saint Mary's Church and Lord Leycester's Hospital before dispersing.

The third party left in good time on Friday morning for Worcester, where they were met by Mr. Albert Buck (Past President), under whose able guidance a full day of

sightseeing was spent. The Dean of Worcester courteously acted as guide over the cathedral, and greatly interested the visiting Members by his description of the beauties of the edifice entrusted to his charge, and his account of its history.

Messrs. Webb and Company's Horse Hair Factory, the Royal Porcelain Works, and Messrs. Dent and Company's Glove Factory were also visited, and proved of great interest to Members. The first mentioned is, it is believed, a unique manufacture in Great Britain, while the other two are so well known by reputation as to need no comment.

The Council are happy to record that the Birmingham Meeting compares favourably with those of previous years in attendance, in the interest of the Papers and discussion, and in the general arrangements. For this happy result they feel that their most hearty thanks are due to Mr. W. D. Gilpin-Brown, the Provincial Chairman, to Mr. F. Pinney, the energetic and painstaking Local Honorary Secretary, and to the other Members of the Reception Committee. They recognise that the organisation of a conference, on the scale which has now been attained by the Annual Country Meetings of The Institution, must entail an immense amount of work on those gentlemen who are good enough to undertake the responsibility of the various details. They are glad, therefore, of this opportunity of expressing their gratitude to them for the time and trouble they have given to make the Meeting a success, and for their hospitable entertainment of the visiting Members.

The thanks of the Council are also due and have been conveyed to the Lord Mayor and Corporation of the City of Birmingham for their courtesy in permitting the use of the Council Chamber for the opening ceremony

and conference; to Messrs. Cadbury for their hospitality at their model village of Bournville, and to the other gentlemen who kindly threw open their works to visiting Members, and in other ways helped to add interest to a meeting which will always be looked back upon with pleasure by those who took part in it.

BALANCE SHEET

1905. ASSETS.

| | | | | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|
| CASH at Bankers and in hands of the Secretary :— | | | | | | | | | |
| Current Account (including £50 in the hands of the Secretary) ... ... ... ... ... | | | | 126 | 14 | 7 | | | |
| Reserve Fund ... ... ... ... ... | | | | 557 | 12 | 6 | | | |
| Library, Forestry, and Geological " Account ... ... ... | 701 | 17 | 11 | | | | | | |
| Less Loan to General Account | 600 | 0 | 0 | | | | | | |
| | | | | 101 | 17 | 11 | | | |
| " Prize Endowment " Capital Account ... ... | | | | 0 | 14 | 9 | | | |
| " Prize Endowment " Income Account ... ... | | | | 81 | 1 | 1 | | | |
| | | | | | | | 868 | 0 | 10 |
| Furniture ... ... ... ... ... | | | | | | | 1,336 | 3 | 0 |
| Library, Forestry, and Geological Account ... ... | | | | | | | 5,362 | 8 | 4 |
| INVESTMENTS : | | | | | | | | | |
| The Premises No. 11, Great George Street, Westminster ... ... ... ... | | | | | | | 20,230 | 19 | 8 |
| Library, Forestry, and Geological Account. | | | | | | | | | |
| £ s. d. | | | | | | | | | |
| 1,900 0 0 Consols 2½% at 89¼ ... ... | | | | | | | 1,695 | 15 | 0 |
| Prize Endowment Account. | | | | | | | | | |
| £ s. d. | | | | | | | | | |
| 503 1 11 India 3% Stock at 96½ ... ... | | | | 485 | 9 | 8 | | | |
| 278 0 3 Midland Railway 2½% Debenture Stock at 78 ... ... ... ... | | | | 216 | 16 | 11 | | | |
| 254 0 0 North British Railway No. 1 Preference Stock at 119 ... ... ... | | | | 302 | 5 | 2 | | | |
| 413 16 8 New 2½% at 88 ... ... ... | | | | 364 | 3 | 5 | | | |
| 440 10 8 India 3½% at 104½ ... ... ... | | | | 460 | 7 | 2 | | | |
| 500 0 0 Courage and Co. 3½% B Debenture Stock at 80 ... ... ... | | | | 400 | 0 | 0 | | | |
| | | | | | | | 2,229 | 2 | 4 |
| Reserve Fund. | | | | | | | | | |
| £ s. d. | | | | | | | | | |
| 1,708 1 4 Consols 2½% at cost price ... ... | | | | | | | 1,500 | 0 | 0 |
| Amounts due, but unpaid at date, viz.:— | | | | | | | | | |
| Subscriptions and Entrance Fees ... ... ... | | | | 593 | 5 | 0 | | | |
| Fees for hire of Rooms ... ... ... | | | | 27 | 16 | 6 | | | |
| Rent of Offices, &c. (Tribunal of Appeal) ... ... | | | | 33 | 5 | 0 | | | |
| Rent of No. 11, Great George Street, Westminster ... | | | | 225 | 0 | 0 | | | |
| Publications ... ... ... .. ... | | | | 2 | 19 | 9 | | | |
| | | | | | | | 882 | 6 | 3 |
| | | | | | | | £34,104 | 15 | 5 |

N.B.—The above Assets do not include the value of the Institution Premises No. 12, Great George Street, held on a Lease for 999 years from 1895.

31ST DECEMBER, 1905.

LIABILITIES. 1905.

| | £ | s. | d. |
|---|---|---|---|
| Accumulations Account ... ... ... ... ... | 20,117 | 9 | 4 |
| Library, Forestry, and Geological Account ... ... ... | 7,760 | 1 | 3 |
| Prize Endowment Capital Account ... ... ... ... | 2,229 | 17 | 1 |
| Prize Endowment Income Account ... ... ... ... | 81 | 1 | 1 |
| Examinations Suspense Account ... ... ... ... | 991 | 4 | 0 |
| Reserve Fund ... ... ... .. ... ... | 2,057 | 12 | 6 |
| Due to Sundry Creditors ... ... ... ... ... | 867 | 10 | 2 |
| | £34,104 | 15 | 5 |

Examined with books, vouchers, &c., and found correct.

TANSLEY WITT, Chartered Accountant.
40, *Chancery Lane, W.C., 3rd May*, 1906.

H. C. NEWMARCH.
STANLEY HICKS.
*Auditors.*

| | RECEIPTS. | £ s. d. | £ s. d. | £ s. d. |
|---|---|---|---|---|
| | | | FOR THE YEAR ENDED | |
| 1905. Jan. 1st. | To Cash at Bankers and in hands of Secretary, viz.:— | | | |
| | On Current Account including £50 Petty Cash in the hands of the Secretary ... | | | 868 2 3 |
| Dec. 31st. | RECEIPTS ON INCOME ACCOUNT:— | | | |
| | To 1,744 Fellows' Subscriptions at £3 3s. | 5,493 12 0 | | |
| | „ 63 Fellows' Subscriptions, Arrears at £3 3s. ... ... ... | 198 9 0 | | |
| | „ 19 Fellows' Subscriptions paid in advance for 1906 at £3 3s. ... ... | 59 17 0 | | |
| | „ 14 Fellows' Subscriptions (on account of Members reinstated) at £3 3s. ... | 44 2 0 | | |
| | „ Differences of Subscriptions on transfer | 17 17 0 | 5,813 17 0 | |
| | „ 1,313 Professional Associates', Associates', and Colonial Fellows' Subscriptions at £2 2s. ... ... ... | 2,757 6 0 | | |
| | „ 60 Professional Associates', Associates', and Colonial Fellows' Subscriptions, Arrears at £2 2s.... ... ... | 126 0 0 | | |
| | „ 1 Colonial Fellow's Subscription part paid ... ... ... ... | 1 1 0 | | |
| | „ 9 Professional Associates', Associates', and Colonial Fellows' Subscriptions paid in advance for 1906 at £2 2s. | 18 18 0 | 2,903 5 0 | |
| | „ 354 Students' Subscriptions at £1 1s. | 371 14 0 | | |
| | „ 13 Students' Subscriptions paid in advance for 1906 at £1 1s. ... ... | 13 13 0 | 385 7 0 | |
| | „ Hire of Rooms ... ... ... | | 726 1 6 | |
| | „ Dividends, Interest, &c. ... ... | | 276 6 5 | |
| | „ Rent of Leasehold Property, 11, Great George Street, S.W. ... ... | 225 0 0 | | |
| | Less Ground Rent on same ... | 82 10 0 | 142 10 0 | |
| | | | | 10,247 6 11 |
| | EXAMINATIONS ACCOUNT:— | | | |
| | To Candidates' Examination Fees ... | 1,554 0 0 | | |
| | „ Sale of Syllabus ... ... ... | 54 16 5 | 1,608 16 5 | |
| | Less Examiners' and Moderators' Fees, Hire of Hall, and Sundry Disbursements ... ... | | 1,025 19 6 | 582 16 11 |
| | „ Loan Account (From Library Fund) ... | | | 600 0 0 |
| | RECEIPTS ON CAPITAL ACCOUNT:— | | | |
| | To 13 Fellows' Entrance Fees at £5 5s. ... | 68 5 0 | | |
| | „ 34 Fellows' Difference of Entrance Fees at £2 2s. ... ... ... | 71 8 0 | 139 13 0 | |
| | „ 250 Professional Associates', Associates', and Colonial Fellows' Entrance Fees at £3 3s. ... ... | | 787 10 0 | |
| | „ Sale of Investments ... ... | | 20,105 14 4 | |
| | | | | 21,032 17 4 |
| | RESERVE FUND:— | | | |
| | To Dividends ... ... ... | | | 37 4 5 |
| | | | | £33,368 7 10 |

31st December, 1905. PAYMENTS.

| | £ s. d. | £ s. d. | £ s. d. |
|---|---|---|---|
| 1905. Dec. 31st **Payments on Income Account:—** | | | |
| By *Transactions:* Publication and Reporting ... ... ... ... | 686 18 4 | | |
| Less sale of *Transactions* ... | 29 6 7 | | |
| | | 657 11 9 | |
| „ *Professional Notes:* Publication ... | 389 8 3 | | |
| Less sale of *Professional Notes* | 10 10 0 | | |
| | | 378 18 3 | |
| „ Salaries, Pension, &c. ... ... | 2,827 1 4 | | |
| „ Wages ... ... ... ... | 295 2 0 | | |
| | | 3,122 3 4 | |
| „ Council Medal ... ... ... | | 44 15 0 | |
| „ Sundry Disbursements and Housekeeper's Account ... ... ... | | 418 15 1 | |
| „ Postage and Receipt Stamps, General... | 312 11 9 | | |
| „ „ *Transactions* ... | 269 1 2 | | |
| „ „ *Professional Notes* | 95 7 6 | | |
| | | 677 0 5 | |
| „ Corporation Duty, Rates, and Taxes ... | | 831 16 5 | |
| „ Fuel, Light, and Water ... ... | | 231 1 2 | |
| „ Ground Rent, less Tax ... ... | 950 0 0 | | |
| Less Amount received from the Tribunal of Appeal ... | 120 0 0 | | |
| | | 830 0 0 | |
| „ Conversazione ... ... ... | | 245 5 2 | |
| „ Repairs ... ... ... ... | | 153 15 8 | |
| „ Stationery, Books of Account, &c. ... | | 79 12 6 | |
| „ Country Meeting at Exeter ... ... | | 119 1 7 | |
| „ Printing, Lithography, and Binding ... | | 545 19 7 | |
| „ Parliamentary Papers and Periodicals | | 45 16 11 | |
| „ Provincial Committees and Junior Meetings ... ... ... | | 515 12 5 | |
| | | | 8,897 5 3 |
| „ Law Charges *re* London Building Act, &c. ... ... ... ... | | | 1,202 0 7 |
| „ Interest on Purchase Money, No. 11, Great George Street, S.W. ... | | 37 9 7 | |
| Less adjustment of Taxes ... | | 5 3 0 | |
| | | | 32 6 7 |
| **Examinations "Suspense" Account:—** | | | |
| By Entrance Fees transferred ... ... | 270 18 0 | | |
| „ Subscriptions transferred ... ... | 116 11 0 | | |
| „ Examination Fees transferred ... | 110 5 0 | | |
| „ Examination Fee refunded ... ... | 1 1 0 | | |
| | | 498 15 0 | |
| Less Examination Fees received ... | | 495 12 0 | |
| | | | 3 3 0 |
| **Payments on Capital Account:—** | | | |
| By Purchase of £2,298 15*s.* 6*d.*, Consols $2\frac{1}{2}$% ... ... ... | | 2,100 11 2 | |
| „ Purchase of No. 11, Great George Street, S.W. ... ... ... | 20,000 0 0 | | |
| „ Law Charges *re* Purchase of No. 11, Great George Street, S.W. ... | 230 19 8 | | |
| | | 20,230 19 8 | |
| „ Furniture ... ... ... ... | | 217 14 6 | |
| | | | 22,549 5 4 |
| „ Cash at Bankers and in hands of Secretary, including £50 Petty Cash | | | 684 7 1 |
| | | | £37,368 7 10 |

LIBRARY, FORESTRY, AND

| 1905. | | £ | s. | d. |
|---|---|---|---|---|
| Dec. 31st. | To Purchase of Books, Maps, &c.:— | | | |
| | General Library ... ... £46 13 8 | | | |
| | Loan Library ... ... 4 17 6 | | | |
| | | 51 | 11 | 2 |
| | „ Insurance ... ... ... ... ... | 4 | 10 | 0 |
| | „ Geological Cases and Trays ... ... ... | 112 | 15 | 0 |
| | „ Honorarium for arrangement of Geological Museum ... | 60 | 10 | 0 |
| | „ Printing ... ... ... ... ... | 11 | 9 | 6 |
| | „ Annual Subscription to London Topographical Society | 1 | 1 | 0 |
| | „ Amount of Depreciation written off ... ... | 137 | 10 | 0 |
| | „ Balance carried forward* ... ... ... ... | 7,760 | 1 | 3 |

* Cash in hand ... ... £ 101 17 11
Loan to General Account ... 600 0 0
£1,900 Consols 2½% at 89¼ ... 1,695 15 0
Value of Books, Forestry, and Geological Collection ... 5,362 8 4

£8,139 7 11

ACCUMULATIONS

| 1905. | | £ | s. | d. |
|---|---|---|---|---|
| Dec. 31st. | To Depreciation on Furniture ... ... ... | 70 | 0 | 0 |
| | „ Law Costs in connection with the London Building Act Amendment Bill, &c. ... ... ... ... | 1,202 | 0 | 7 |
| | „ Balance carried forward ... ... ... ... | 20,117 | 9 | 4 |

£21,389 9 11

## GEOLOGICAL ACCOUNT.

| 1905. | | £ | s. | d. |
|---|---|---|---|---|
| Jan. 1st. | By Balance brought forward ... ... ... | 7,653 | 10 | 3 |
| Dec. 31st. | „ Increased Values at this date, viz.:— | | | |
| | Books purchased ... ... ... £51 11 2 | | | |
| | Books presented ... ... ... 23 10 0 | | | |
| | | 75 | 1 | 2 |
| | „ Dividends on £1,900 Consols 2½% .. ... | 45 | 3 | 6 |
| | „ Donations ... ... ... ... ... | 351 | 8 | 0 |
| | „ Increased value of Investments ... ... ... | 14 | 5 | 0 |
| | | £8,139 | 7 | 11 |
| 1906. | | | | |
| Jan. 1st. | By Balance brought forward... ... ... ... | £7,760 | 1 | 3 |

## ACCOUNT.

| 1905. | | £ | s. | d. |
|---|---|---|---|---|
| Jan. 1st. | By Balance brought forward ... ... ... | 18,556 | 4 | 4 |
| Dec. 31st. | „ Excess of Income applicable to 1905 £1.434 19 11 | | | |
| | Less amount transferred to Reserve Fund Account ... 500 0 0 | | | |
| | | 934 | 19 | 11 |
| | „ Excess of Receipts over Payments on Examinations Account ... ... ... ... ... | 582 | 16 | 11 |
| | „ Excess of Receipts over Payments on Capital Account | 927 | 3 | 0 |
| | „ Profit on Sale of Investments ... ... ... | 388 | 5 | 9 |
| | | £21,389 | 9 | 11 |
| 1906. | | | | |
| Jan. 1st. | By Balance brought forward .. .. ... | £20,117 | 9 | 4 |

"PRIZE ENDOWMENT"

| 1905. | | | | £ | s. | d. |
|---|---|---|---|---|---|---|
| Dec. 31st. To decrease in value of Investments ... | | | ... | 58 | 3 | 8 |
| „ Balance carried forward ... | | | ... | 2,229 | 17 | 1 |
| "Penfold Gift"— | | | | | | |
| £503 1*s.* 11*d.* India 3% Stock at 96½ ... ... | 485 | 9 | 8 | | | |
| "Beadel Bequest"— | | | | | | |
| £278 0*s.* 3*d.* Midland Railway 2½% Debenture Stock at 78 ... ... | 216 | 16 | 11 | | | |
| Cash in hand ... ... | 0 | 14 | 9 | | | |
| "Crawter Bequest"— | | | | | | |
| £254 North British Railway No. 1 Preference Stock at 119 ... ... | 302 | 5 | 2 | | | |
| "Daniel Watney Gift"— | | | | | | |
| £413 16*s.* 8*d.* New 2½% Annuities at 88 ... | 364 | 3 | 5 | | | |
| "Driver Bequest"— | | | | | | |
| £440 10*s.* 8*d.* India 3½% Stock at 104½ ... ... | 460 | 7 | 2 | | | |
| "Galsworthy Gift"— | | | | | | |
| £500 Courage & Co. 3½% B Debenture Stock at 80 | 400 | 0 | 0 | | | |
| | | | | £2,288 | 0 | 9 |

"PRIZE ENDOWMENT

| 1905. | | | | £ | s. | d. |
|---|---|---|---|---|---|---|
| Dec. 31st. To Paid for "Beadel Prize" ... | ... | ... | ... | 5 | 0 | 0 |
| „ Paid for "Driver Prize" ... | ... | ... | ... | 15 | 11 | 6 |
| „ Paid for "Crawter Prize" ... | ... | ... | ... | 10 | 8 | 3 |
| „ Paid for "Penfold Prize" ... | ... | ... | ... | 28 | 19 | 6 |
| „ Paid for "Galsworthy Prize" | ... | ... | ... | 3 | 9 | 6 |
| „ Balance carried forward ... | ... | ... | ... | 81 | 1 | 1 |
| | | | | £144 | 9 | 10 |

## CAPITAL ACCOUNT.

| 1905. | | £ | s. | d. |
|---|---|---|---|---|
| Jan. 1st. | By Balance brought forward ... .. ... | 2,288 | 0 | 9 |
| | | £2,288 | 0 | 9 |
| 1906. | | | | |
| Jan. 1st. | By Balance brought forward ... .. ... ... | £2,229 | 17 | 1 |

## INCOME ACCOUNT.

| 1905. | | £ | s. | d. | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| Jan. 1st. | By Balance brought forward ... ... | | | | 71 | 17 | 10 |
| | „ Dividends, viz.:— | | | | | | |
| | "Beadel" Bequest ... ... | 6 | 12 | 0 | | | |
| | "Driver" Bequest ... ... | 14 | 18 | 0 | | | |
| | "Crawter" Bequest ... ... | 9 | 13 | 0 | | | |
| | "Penfold" Gift ... ... | 14 | 6 | 8 | | | |
| | "Daniel Watney" Gift ... ... | 9 | 16 | 4 | | | |
| | "Galsworthy" Gift ... ... | 16 | 12 | 6 | | | |
| | | | | | 71 | 18 | 6 |
| | „ Excess of Expenditure on the "Driver" Prize, transferred to Revenue General Prize Account ... ... | | | | 0 | 13 | 6 |
| | | | | | £144 | 9 | 10 |
| 1906. | | | | | | | |
| Jan. 1st. | By Balance brought forward ... ... .. ... | | | | £81 | 1 | 1 |

# APPENDIX TO VOL. XXXVIII.

## Obituary.

THOMAS BANKS (Fellow) was born at Bretherton, near Preston, in February, 1844, and was educated at Ormskirk Grammar School. On leaving, he was articled to a firm in Preston, and afterwards took a situation with Messrs. Burd and Company, the well-known Shrewsbury firm.

In 1869 he went to reside at Leigh, and became, first assistant to, and then partner with, the late Mr. Atherton Selby.

In 1874, he commenced on his own account, and in 1881, the business having greatly extended, he established the firm of Banks, Fairclough, and Stephen, subsequently opening an office at 60, King Street, Manchester.

As a mining engineer, his work covered a wide field of operations, and he was especially regarded as an expert on all matters relating to collieries and coal mines. He joined The Institution as a Fellow in November, 1891.

His death occurred in June, 1905, from heart failure, at the age of 61.

JOHN BOWDEN (Fellow), an eminent Lancashire surveyor, started his professional career as assistant surveyor to the Corporation of Preston, a position

which he held for four years. From 1868 to 1872 he was district surveyor for the borough of Salford, and he then became surveyor to the De Trafford Estates. For many years he was in business in Manchester as an architect, valuer and surveyor. Mr. BOWDEN was elected a Fellow of The Institution on December 10th, 1888.

He died in December, 1905.

ROBERT ALEXANDER BRYDEN (Fellow), whose death occurred in April, 1905, at the age of 64, was a native of Glasgow. After leaving school he was apprenticed to Messrs. Clarke and Bell, architects, and gave such proofs of ability and love for his profession that he soon became chief assistant and later a partner in the firm.

Some of the principal buildings in the city of Glasgow are from his designs, one of the most notable being the splendid pile in Bothwell Street comprising the Christian Institute, the Bible Training Institute, and the Young Men's Christian Association Club. He also gave special attention to hospital design.

His wide experience and knowledge brought him a large connection as a property valuer, and he appeared as witness in many important cases.

Mr. BRYDEN was an enthusiastic volunteer, and was for some years captain in the Lanark Garrison Artillery Volunteers, retiring with the rank of honorary major.

He was elected a Fellow of The Institution in November, 1891, and since 1878 had been a Fellow of the Royal Institute of British Architects.

TIMOTHEUS HENRY BURD (Fellow) was the son of Laurence Burd of Shrewsbury. He was born in 1862,

and was educated at Clifton College and Jesus College, Cambridge. He subsequently joined the firm of Burd and Evans, founded by his grandfather a century ago, of which his father was then the head.

He devoted himself mainly to the land agency business of the firm, and acted personally for, among others, Lord Berwick, Sir Raymond Tyrwhitt Wilson, Bart., and Sir Bryan Leighton, Bart.

Mr. BURD, not being a man of very robust health, did not, apart from his business, take any active position in public affairs; he, like his father, had considerable artistic ability, and devoted his leisure time to painting; he had also a fancy for curios, of which he left a large collection.

He died from cancer at the early age of 43.

HENRY HYMAN COLLINS (Fellow), whose death from pneumonia and influenza occurred at his residence in Maida Vale on 13th December, 1905, at the age of 74, was for nearly 30 years district surveyor for the eastern division of the City of London. He had also an extensive private practice as an architect and surveyor, a large number of City offices and warehouses, as well as hospitals and country houses having been built from his designs. He had been a member of the Royal Institute of British Architects since 1859.

Mr. COLLINS was a very early Member of The Institution, having joined two months after its formation in 1868. He was a frequent speaker at the Ordinary General Meetings, and in March, 1881, contributed a most valuable Paper to the *Transactions* entitled "Sanitation as an Increment of Value in House "Property."

Mr. COLLINS took a great interest in municipal

affairs, and was an alderman of the borough of Paddington.

JOHN CRAWTER (Fellow) was born at Cobham in Surrey on 3rd October, 1818, his father being in practice there as a surveyor. He left in 1853 and took up the practice of Mr. Henry Crawter, senior, of Cheshunt, where he resided till his death on 19th March, 1906. He was largely employed in tithe matters, and was for many years agent for the Meux Estate, during which period over a million of money accumulated. He was also agent for Lord Chesterfield, Sir E. S. Hardinge, Bart., and numerous other owners.

In 1870 he joined his brother Henry, an early Member of the Council and deputy surveyor to the Mercers' Company and the New River Company, who was at that time in failing health.

In local matters he was very active, being churchwarden, chairman of the Cheshunt Urban District Council, trustee of the Building Society, foreman of the Homage of the Court Baron, &c.

Mr. CRAWTER was a very early Member of The Institution, having joined in January, 1869.

JOHN DANSKEN (Fellow) was born at Glasgow in 1836, and was educated at denominational schools, the Glasgow Athenæum evening classes, and the University of Glasgow. He was apprenticed to the late Mr. Thomas D. Smellie, and acted as his chief assistant for several years. From 1858 till 1890 he was in business on his own account as a quantity surveyor and valuer, and in 1890 he took into partnership his former chief assistant Mr. Pardie. Mr. DANSKEN acted for H.M. Inland

Revenue Department, the Corporation of Glasgow, the Glasgow District Lunacy Board, and other public bodies, and was employed by the late Lord Blantyre for over 41 years.

He was elected a Fellow of The Institution on 4th November, 1891.

Mr. DANSKEN'S death took place on 1st November, 1905, from acute pneumonia, at the age of 69.

ADOLPHUS FINN (Fellow) was the sixth son of the late Mr. Francis Finn, of Denge Marsh, Lydd. He was a partner in the firm of Messrs. Reeve and Finn, and was also one of the largest farmers and graziers in Romney Marsh, occupying upwards of 1,200 acres in addition to land which he managed as agent.

Mr. FINN was by birth a freeman of the borough of Lydd, and under the old regime he for many years held the position of chamberlain. On the incorporation of the borough he was unanimously elected treasurer, and held that post to the universal satisfaction of the burgesses until his death.

He joined The Institution in 1891, and died in July, 1905.

GEORGE SPALDING FLEETWOOD (Professional Associate) served his articles with Messrs. Widnall and Trollope, and afterwards joined his father, Mr. George Fleetwood, in business as a quantity surveyor.

He became a Professional Associate in 1896.

Dr. WILLIAM FREAM (Associate) was born in Gloucester, in 1855, and, obtaining a scholarship at the Royal College of Science, Dublin, while still a youth, had

his undoubted talents directed towards the study of rural science, a subject for which he had always a natural inclination.

In 1877 he was appointed Professor of Natural History at the Royal Agricultural College, Cirencester. Two years later he accepted the post of Lecturer in Botany at Guy's Hospital Medical School, and in 1880 he founded the Downton Agricultural College in conjunction with Professor Wrightson. As a writer on agricultural subjects he was best known, his articles under the heading of Agriculture, which have appeared weekly in the *Times* since 1894, being recognised as models of agricultural journalism.

Dr. FREAM had been an Associate of The Institution for 20 years, and had long acted as Examiner in Agriculture and kindred subjects for the Intermediate and Final Examinations.

HERBERT FURBER (Fellow), head of the old-established firm of Messrs. Furber, of Warwick Court, High Holborn, died, after a very short illness, on 2nd March, 1906.

He was one of the arbitrators approved by the Board of Trade, and consulting valuer to the London County Council, and frequently appeared as an expert witness in claims for compensation and other cases. A large amount of business was carried through by him in connection with the Holborn to Strand Improvement. He was engaged in most of the cases of the London United Tramways undertaking and the Middlesex Electric Tramways. Mr. FURBER joined The Institution in March, 1882.

THOMAS WILLIAM GAZE (Fellow) was born in

1838 at Higham. On finishing his education he was articled to the late Mr. Charles Atkins, and afterwards entered upon possession of Morton Hall Farm of about 700 acres. Here, besides farming, he conducted the business of a valuer. Next he took a farm under Lord Henniker, at Thornbean, and finally became the occupier of Frenze Hall, near Diss.

Mr. GAZE was elected a Fellow of The Institution in December, 1889. He died in July, 1905, in his 68th year.

WILLIAM GOLDSMITH (Fellow), the eldest son of Mr. William Wooldridge Goldsmith, was born on 4th April, 1857.

After leaving school he was articled to Messrs. Osborn and Russell for three years, remaining with them as assistant until their dissolution of partnership in 1880, when he started on his own account. Among other appointments he held the posts of surveyor to the Imperial Fire Office and the Lion Insurance Company.

He was elected a Fellow of The Institution in 1891, and had been an Associate of the Royal Institute of British Architects since 1882.

He died on the 14th April, 1906, after three days' illness, at the early age of 49.

SPENCER W. GORE (Fellow), who died on the 20th April, 1906, aged 56, was the second son of the Hon. Charles A. Gore. Educated at Harrow, he afterwards received practical instruction in agricultural matters on a Lincolnshire farm. Entering the office of Mr. Edmund James Smith, he became a partner in 1874, and on that gentleman's death in 1880 succeeded to the

Receivership of the Crown Northern Estates, the firm also holding the agency of the northern estates of the Ecclesiastical Commissioners. Among other matters in which Mr. GORE was interested, the problem of adapting auto-motor power to general agricultural purposes engaged his attention.

JAMES GREEN (Fellow) was born at Lincoln's Inn Fields in 1838, and commenced his professional career as articled pupil to Messrs. Chinnock, Galsworthy, and Company. In 1860 he, in partnership with Mr. Henry Weatherall, founded the now well-known firm of Weatherall and Green.

Mr. GREEN held numerous public appointments. He was on the list of consulting valuers and surveyors for several departments of His Majesty's Government as well as for the London County Council and various public and private corporations and companies, in London and the provinces. He was also very largely employed in railway and other compensation cases, both on behalf of companies and claimants.

Mr. GREEN enjoyed the unique distinction of being the arbitrator appointed by the Local Government Board in all inquiries held during his lifetime on the subject of betterment in Manchester and London, the London betterment inquiries comprising, among others, those in respect of the Tower Bridge approaches and the Strand and Tottenham Court Road Improvements. He was also the umpire appointed to value the whole of the North Metropolitan Tramway System on its acquisition by the London County Council.

Mr. GREEN acted largely as arbitrator and umpire in matters arising under the Lands Clauses Act and the Housing of the Working Classes Act.

He joined The Institution in January, 1882.

His death, at the age of 68, took place in December, 1905.

THOMAS JAMES HANKINSON (Fellow), whose death occurred in December, 1905, was the son of Mr. Charles Hankinson, and came of an old Lancashire family. In 1858 he took up business in Bournemouth.

For over 40 years he was agent for the Branksome Estate, rapidly developing land which in early days was a mere tract of heathland and bog, but which ultimately became very valuable, with a considerable rent-roll.

He took a great interest in the town of Bournemouth and a prominent part in its government, having been twice chairman of the old Board of Improvement Commissioners and the first Mayor after its incorporation.

Mr. HANKINSON was elected a Fellow of The Institution on 6th January, 1890.

ROBERT WILKIN HEDLEY (Fellow), after acquiring a practical knowledge of surveying as pupil and assistant in the office of his father, Mr. Thomas Fenwick Hedley, for five years, became a member of the firm of Hedley, Mason, and Hedley on its formation in 1876. As an expert rating surveyor he was a familiar figure in all parts of southern England, and notably at the Clerkenwell Sessions, and he had also a wide connection in South Wales.

He was elected a Fellow of The Institution on the 11th February, 1884, and died in December last, at the age of 51.

GEORGE THOMPSON HEWETT (Professional Associate) was educated at the Castle School, Guildford.

After leaving school he was for some few years assistant to his father, who had a considerable agricultural valuation practice, and on his death went into the office of Mr. William Lee, becoming a partner in 1892.

Mr. HEWETT was the chairman of the Pullenham Parish Council and churchwarden of the parish church. Until recently he farmed a considerable amount of land.

He became a Professional Associate of The Institution on 4th October, 1893. His death occurred in February, 1906.

JOHN HOLME (Fellow), whose death occurred in August, 1905, at the age of 75, was a well-known land agent in Westmoreland, acting for many years as agent for the Dallam Tower Estates and other properties in the neighbourhood.

He had a high reputation as a valuer, and was also largely engaged in arbitration work.

Mr. HOLME took a great interest in the local government of his county, being a member of the County Council of Westmoreland and chairman of the Finance and the Standing Joint Committees.

In 1904 he was elected an alderman. He was also a justice of the peace and a deputy-lieutenant of his county.

Mr. HOLME joined The Institution on 9th November, 1885, and was the first chairman of the Cumberland and Westmoreland Provincial Committee.

SAMUEL KINGSTON (Fellow), who was born December 9th, 1829, entered his father's business and in time became its head, being joined 30 years ago by his nephew. He was also a well-known agriculturist, having

several large farms in the neighbourhood of Spalding, and owning a considerable amount of property in the district and in the neighbouring counties.

Mr. KINGSTON was elected a Fellow of The Institution in May, 1882. He was also a member of the Midland Counties Valuers' Association and the Wisbech and District Valuers' Association, and a founder and early president of the Lincolnshire Land Agents' and Tenant Right Valuers' Association.

His death occurred on Wednesday, 6th, September, 1905, at the age of 76.

JOHN WILLIAM MARGETTS (Fellow), whose death occurred in May, 1905, at the age of 66, began his professional career in 1856 as articled pupil to the late Mr John Holbeche of Birmingham. Five years later he joined the firm of John Margetts and Son, and eventually became its head. He was greatly esteemed as an umpire by Midland valuers.

He was elected a Fellow of The Institution on January 24th, 1887.

MARTIN NOCKOLDS (Fellow), whose death at the age of 66 occurred in May, 1906, was educated at Rugby, and obtained his earliest professional training as a pupil in the office of Messrs. Clutton. Succeeding his father as the head of an old-established land agency business at Saffron Walden, he acted as agent for the Duke of Leeds, Lord Braybrooke, Mr. Robert Barclay, and several Cambridge College estates, besides being largely employed in compensation and valuation work. In 1900 Mr. Nockolds' two sons were taken into partnership by him.

He had always interested himself in the local govern-

ment of his neighbourhood, and had held several public offices at Saffron Walden.

His connection with The Institution had extended over 30 years.

JOHN PRICE (Fellow) was educated at the Manchester Grammar School and the Victoria University. In 1871 he was articled to Mr. Hartley Watson of Manchester, and in 1874 obtained an appointment as engineer to the contractor of the Hollinwood Branch of the Lancashire and Yorkshire Railway. Later on he entered the office of Mr. Arthur Jacobs, who was engaged as consulting engineer in the drainage of Barrow-in-Furness, and when that gentleman was appointed engineer to Salford Corporation he was accompanied by Mr. Price. In this way his career was turned in the direction of the public service, and later he was appointed consecutively surveyor to the Barton Sanitary Authority, near Manchester, surveyor to the Toxteth Park Local Board, Liverpool, and assistant city engineer to the Liverpool Corporation. In 1896 he went as assistant surveyor and engineer to the city of Birmingham, being promoted to the chief appointment two years later. His work in Birmingham in connection with the sewerage schemes, the diversion of the River Rea, and the Small Heath Viaduct will long bear witness to his ability as surveyor to the local authority, and his death at the early age of 51 was felt to be a severe loss to the city.

Mr. PRICE, who had been a Fellow of The Institution since 1891, was also a member of the Institution of Civil Engineers.

CHARLES RIGG (Fellow) came of an old Cumber-

land yeoman family. His earliest professional training was as pupil to a land agent near Sheffield, and in 1878 he started business in Cardiff as estate agent and architect, being appointed surveyor to the Mackintosh Estate. In that capacity he had a large share in the development of Cardiff during the last quarter of a century.

He was a keen volunteer, being hon. lieutenant-colonel of the local corps from 1895 to 1901, when he resigned his commission. He was elected a Fellow of The Institution in 1891.

DAVID JAMES ROSS (Professional Associate) was articled in 1861 to Mr. John Foster Pickering, and in 1871 began his official career by joining the engineers' staff of the City Corporation under the late Colonel Haywood. Promotion followed from time to time until, in 1897, the old Sewers Commission having been amalgamated with the Corporation, his services were retained as engineer to the Public Health Department.

Mr. Ross was responsible for many important works during his period of office, the widening of Fleet Street and Lower Thames Street being among the best known.

He had been a Professional Associate of The Institution since 1884, and was also a member of the Institution of Civil Engineers.

RICHARD ARTHUR HAMILTON SEYMOUR (Fellow) was for several years assistant to Mr. F. L. Lightfoot, and afterwards sub-agent on the Earl of Romsey's estates in Kent. In 1879 he was appointed agent to Mr. H. A. Brassey of Preston Hall, Maidstone.

Mr. SEYMOUR was elected a Professional Associate in 1882, and transferred to the Fellowship in 1886.

ROBERT SCOTT (Fellow) was articled to Messrs. Shields and Duff, measurers, Glasgow, and afterwards entered their service as assistant. In 1874 he commenced business in Glasgow on his own account as a measurer, and continued in practice up to the time of his death.

He became a Fellow of The Institution in 1897, and was a Past President of the Glasgow Institute of Measurers.

JOHN SHAW (Past President), by whose death The Institution has to deplore the loss of another of its oldest friends, began his professional life 67 years ago, being articled to Mr. Harding, a land agent at Burton-on-Trent, in the old tithe commutation days. The grounding he then received stood him in good stead in after years, and was supplemented some ten years later by experience gained during the great railway boom, in the surveys for which he took an active part.

In 1849 he began to practise on his own account in Derby, and thus laid the foundation of one of the best known firms of land agents and surveyors in the Midlands. His connection with railway work continued throughout his business career, the Midland Railway in particular taking advantage of his services on the occasion of many important surveys. He was also frequently engaged, on one side or the other, in enclosure questions and claims under the Lands Clauses and other Acts, either as arbitrator or umpire, his well-known uprightness of

character and sterling good sense, together with his marked ability and foresight in business matters, having early pointed to his peculiar fitness for such appointments.

Equally well known was Mr. SHAW in the agricultural world. As agent for the large estates of Sir Vauncey Harpur Crewe in Leicestershire, Derbyshire, and Staffordshire, as well as for other landowners, he came into contact with farmers over a widely differing range of country, and thus obtained a knowledge of agricultural matters second to none in the Midland Counties, which he was always pleased to place at the disposal of any to whom it might be of service.

On the estates for which he acted he will be remembered as a kindly adviser and friend, while the improvements which were carried out during his period of agency, especially in the way of new buildings and cottages, will serve, for many years to come, as a memorial of the wisdom of his direction.

Mr. SHAW retired from active work in 1904, having celebrated the jubilee of his business in Derby in 1899.

He was elected a member of The Institution in 1876, and from the first showed his interest in its welfare by attending meetings and contributing to the *Transactions*. In 1877 he read a valuable Paper on the Rivers Pollution Prevention Act, 1876, and this he followed up in 1884 with an equally able treatise on Farm Tenancy Agreements (Agricultural Holdings Act, 1883). His last Paper before The Institution was delivered on his election as President in 1900, he having become a member of the Council in 1887. On that occasion his Opening Address dealt mainly with the changes which had taken place in agricultural methods and prices during the lengthy

period of his experience, and formed a valuable contribution towards the history of agriculture in this country.

Mr. SHAW was rather shy and retiring in character and a man of few words, but he was endowed with a persuasive manner that often stood him in better stead than vehemence or self-assertion. Nothing was more noticeable in him than his unfailing courtesy on all occasions, and his real kindness of heart. It may be said of him, without exaggeration, that he was one of the best examples of the type of surveyor bred and trained in the strenuous times of 60 years ago, when the capable men in the profession were besieged with work of the most varied character, demanding a wide range of knowledge and business capacity of the highest order.

Of late years failing health made it impossible for him to take a very active part in the affairs of The Institution, but to the last his advice and assistance was readily given when required by his colleagues on the Council.

OSWALD FRANCIS STENNING (Fellow) was educated at Blackheath and Wimbledon, and then at Haileybury. On leaving school he entered his father's office, being subsequently admitted to partnership. At the age of 31 he was appointed surveyor to the Merchant Taylors' Company, and during the parliamentary session of 1905 he was engaged on behalf of the City Companies and the Associated Landowners in opposing the proposed amendment of the London Building Acts. His death at the early age of 33 was due to blood-poisoning following upon an accident to the knee at cricket.

Mr. STENNING had been a Member of The Institution since 1902.

FREDERICK JOHN TURNER (Fellow) was born in Yorkshire in 1824, and articled to the late Mr. John Horncastle of Firbeck, who carried on a very extensive business as land agent and valuer, and was largely employed in tithe apportionments and inclosure awards. Experience of London work was afterwards added to the knowledge thus obtained, Mr. TURNER spending some time in the office of Messrs. Sherrard and Hall, C.E., Westminster.

His first appointment was as agent to Colonel Clowes at Broughton, Manchester, but this he relinquished in 1858 on being selected to take charge of the Duke of Portland's estates in Ayrshire. In 1878 his Grace appointed him agent to the Welbeck Estate, as well as commissioner and general manager for the Ayrshire and Caithness properties, which position he continued to hold until his decease.

On his 80th birthday Mr. TURNER was presented by the Welbeck Estate tenants with his portrait in oils executed by Sir George Reid, together with an illuminated address and other marks of their esteem and appreciation.

Mr. TURNER had been a Fellow of The Institution since 1883. He was a magistrate for the counties of Nottingham and Ayrshire, and was an Inspector under the Land Division of the Board of Agriculture.

CHARLES ALEXANDER WHITE (Fellow), whose death, at the advanced age of 74, took place in October last, began business as a land agent and surveyor in his father's office, being admitted a partner in 1850. Under the title of Messrs. White and Sons, the firm has become

well known, not only in the neighbourhood of Dorking and Leatherhead, but in Sussex, Kent, and Hampshire, as land and tithe agents, surveyors and auctioneers. Mr. CHARLES WHITE undertook the land agency part of the business, acting for Mr. R. Barclay, Mr. Cosmo Bonsor, and other landowners. He also acted as official valuer to the Dorking Urban and Rural District Council. He had been a Fellow of The Institution since 1891, and was also a member of the Surrey and Sussex Valuers' Association.

WILLIAM HENRY WHITE (Fellow) was articled to his father Mr. Benjamin White, formerly surveyor to the London Hospital, to whose business he ultimately succeeded. He acted as surveyor to the Bishop of London's Fund, and had the management of the London estates of Mr. C. W. Lawrence and the late Canon Mason.

He became a Fellow of The Institution in 1891.

GEORGE DAVYS EDWARD WIGLEY (Fellow), whose death occurred at the age of 64, was well known as a land agent in Buckinghamshire and the Midland Counties, where he acted for a large number of landowners, including the Earl of Lytton and Mr. Selby Lowndes. He had also an extensive business as a valuer and auctioneer.

He was elected a Fellow of The Institution in 1890. He was also a member of the Herts, Beds, and Bucks Valuers' Association, of the Midland Counties Tenant-Right Valuers' Association, and of other professional bodies.

Sir JACOB WILSON, K.C.V.O. (Fellow), by whose death the agricultural world loses one of its most prominent figures, was born in 1836, and was grounded in the rudiments of his profession at the Royal Agricultural College, Cirencester, obtaining the diploma of membership in 1855. He was also one of the first to obtain by examination the membership of the Highland and Agricultural Society of Scotland.

He was afterwards appointed agent to the Earl of Tankerville and other landowners in the north of England.

On the formation of the Board of Agriculture in 1889 he was appointed Agricultural Adviser and Director of the Land Division, a position he held until his retirement in 1902. But it was in connection with the Royal Agricultural Society that Sir JACOB was best known. So long ago as 1865 he was elected a member of its Council, and in 1875 he was unanimously chosen hon. director of the show, a position he held to the great advantage of the Society for 18 years. The energy which he displayed in everything connected with the interests of the Society or with agriculture generally, combined with his bonhomie, kindness of heart, and courteous manner, endeared him to all who came into contact with him, from the highest to the lowest.

He was, in 1887, elected the first chairman of the newly constituted Northern Counties Provincial Committee of The Institution.

SIR JACOB WILSON, whose experience was called upon in connection with many Government inquiries, acted as chairman upon the Royal Commission on Agricultural Depression, was a member of the Royal Commission on Horse-breeding, and had been a Fellow of The Institution since 1883.

EDMUND WOODTHORPE, M.A. Oxon (Fellow), received his professional education first at the hands of his father, the late Mr. E. Woodthorpe, F.S.I., F.R.I.B.A., and afterwards in the office of the late Mr. George Somers Clarke. He acted later as assistant to Mr. Basil Champneys and to Sir Aston Webb, R.A.

In 1889 he was appointed district surveyor to the northern division of the City of London.

He was elected a Fellow of The Institution in 1891, and was also a member of the Royal Institute of British Architects and of the Architectural Association.

JAMES WRIGHT (Fellow) was articled to Benjamin Wilson, agent to the Earl of Zetland, and afterwards carried on business on his own account as a land agent and surveyor. Among others he managed the Nun-appleton Estate, and the Rawcliffe and other estates belonging to Mr. Ralph Creyke.

He became a Fellow of The Institution in 1891.

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| Boden, H. C.... ... | 2 | 2 | 0 |
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| Dixon, Francis Evelyn | 2 | 2 | 0 |
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| Tyser, G. L. ... ... | 2 | 2 | 0 | White, R. S. ... ... | 2 | 2 | 0 |
| Veale, L. C. ... ... | 2 | 2 | 0 | White, O. L. ... ... | 2 | 2 | 0 |
| Vernon, A. S. ... | 2 | 2 | 0 | Whittingham, L. S.... | 2 | 2 | 0 |
| Vince, C. H. ... ... | 2 | 2 | 0 | Whitton, H. W. ... | 2 | 2 | 0 |
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| Watt, A. L. ... ... | 2 | 2 | 0 | Woodhams, J. P. ... | 2 | 2 | 0 |
| Watts, F. S. ... ... | 2 | 2 | 0 | Woodward, H. G. ... | 2 | 2 | 0 |
| Webber, W. H. ... | 2 | 2 | 0 | Wykes, H. I.... ... | 2 | 2 | 0 |
| Wheeler, F. W. ... | 2 | 2 | 0 | Youatt, Ernest ... | 2 | 2 | 0 |

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